ERONAUTICS (2)
Vol. XLIX

MAY 23rd, 1946

# FLIGHT

and

## AIRCRAFT ENGINEER

OFFICIAL ORGAN OF THE ROYAL AERO CLUB ONE SHILLING

3 Copies

SMITHSONIAN INSTITUTION
JUN 12 1946
LANGLEY AERONAUTICAL LIBRARY

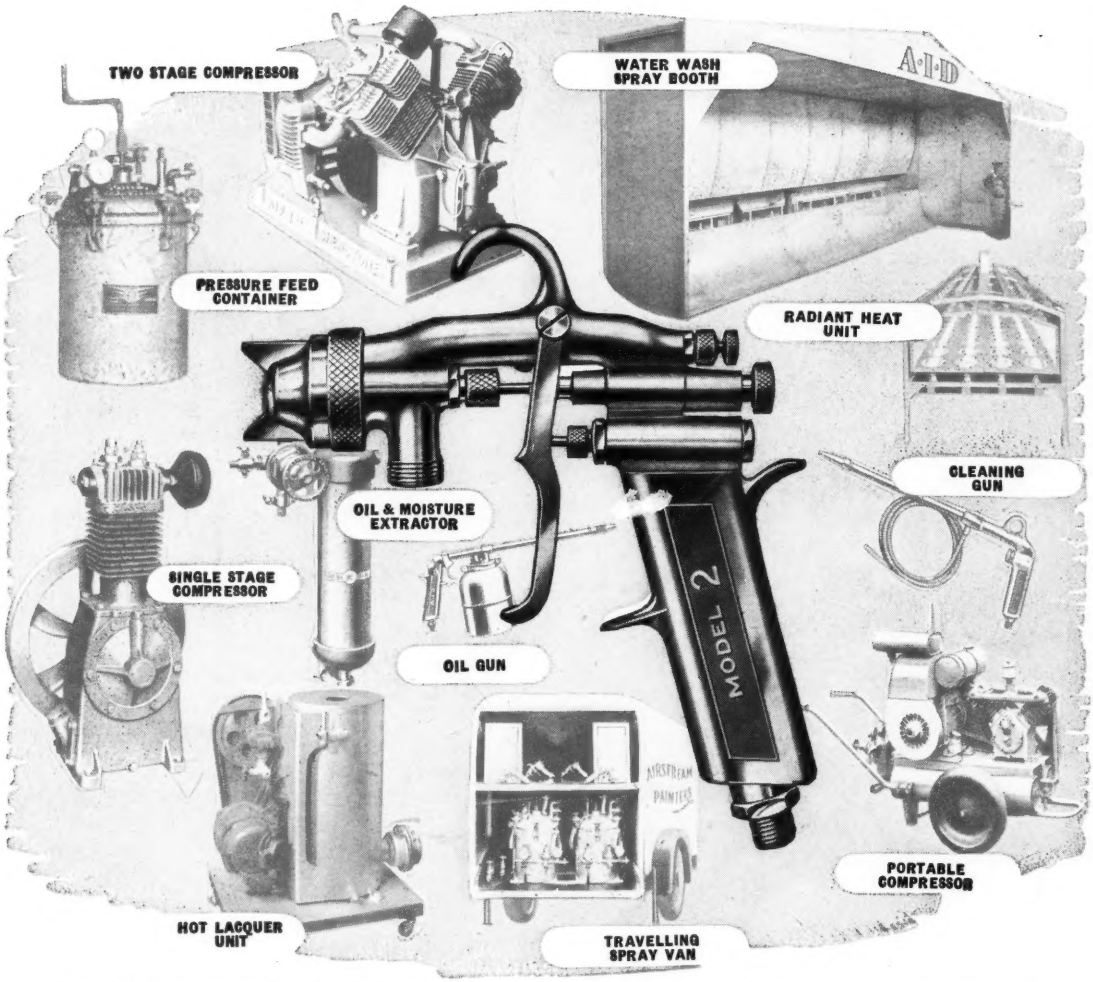
*Cirrus*

THE ENGINE OF PROVED RELIABILITY

BLACKBURN AIRCRAFT LTD.
BROUGH, E. YORKS.

# The GUN

## *and Everything Behind the Gun*




Behind the incomparable A.I.D. Spray Gun is compressed air equipment of every conceivable type, of the highest quality yet devised, for paint spraying and for other industrial finishes. This equipment has won its spurs during recent hostilities . . . proved its superiority on British aircraft, transport, and other munitions of war in a way which can leave no shadow of doubt as to its exceptional dependability and fitness for purpose intended. A.I.D. Compressed Air Equipment is fully adaptable to all peacetime requirements. In each industry it provides appliances and components of the most comprehensive and highly specialised type, plus a spares and maintenance service covering the entire country. Write us . . . let us plan and design your finishing department.

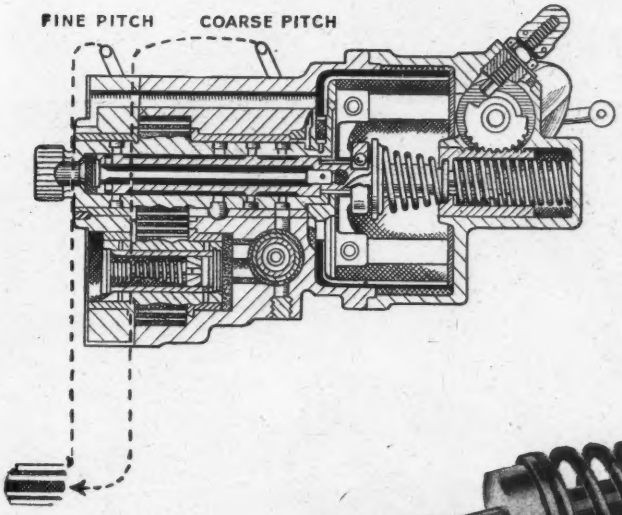
**A·I·D**

**COMPRESSED AIR EQUIPMENT**

*Sole Manufacturers :*
AIR INDUSTRIAL DEVELOPMENTS LIMITED, Aidspray Works, Shenstone, nr. Lichfield, Staffs. Phone : Shenstone 274/5.
Grams : Aidspray, Shenstone. London Office : 28, South Molton Street, W.1. Phone : Mayfair 6318.

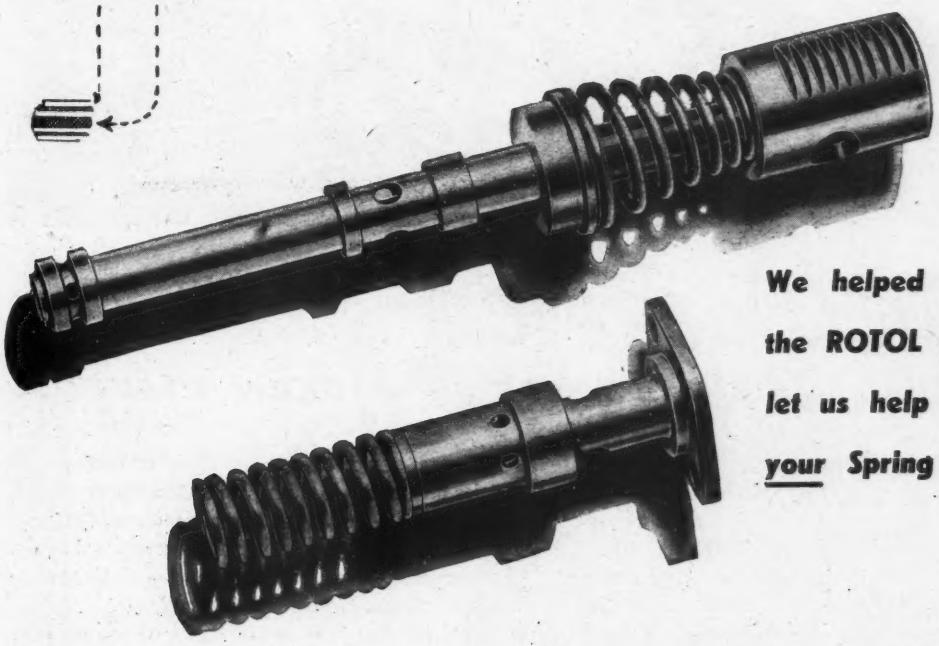
*Scientific* A 12

# CONSTANT SPEED IN VARIABLE-PITCH PROPELLERS




***The Vital Tension!....***

The Rotol Governor Unit is the vital link between propeller and engine to maintain 'constant speed'.... The most vital mechanism of the unit is the Terry Governor Control Spring and Relief Valve Spring which is designed to carry a continually fluctuating load ....a delicate task but — Terry's are equal to it.



***We helped to solve the ROTOL problem; let us help to solve your Spring Problem***

FAMOUS FOR SPRINGS & PRESSWORK SINCE 1855

# TERRY'S for SPRINGS

*HERBERT TERRY & SONS LTD., REDDITCH, ENGLAND. Also at London · Birmingham · Manchester*

OP-J

# A NEW SERVICE

## THAT MEETS THE NEEDS OF MODERN TRAVEL..

To-morrow many motorists will use the air as today they use the roads. Travel by plane will be as safe, practical and efficient as travel by car. It is to meet this new need that Automobile and Aircraft Services has been brought into being. This new organisation covers every post-war transport requirement for big industrial undertakings and private owners alike. It is a Sales and Service organisation for cars, commercial vehicles and planes—it is much more. It gives you on the one hand sound, practical and independent advice on the car, plane or commercial vehicles best suited to your purpose and your budget —on the other, service in the air and on the road specially designed to meet today's exceptional needs. Of these services, too comprehensive even to outline here, we will gladly give you fuller details.

● Enquiries regarding Aircraft, new or second-hand cars or trucks, should be addressed to A. and A. Services Ltd. 45 Dorset Street, London W.1. Tel.: Welbeck 6461.

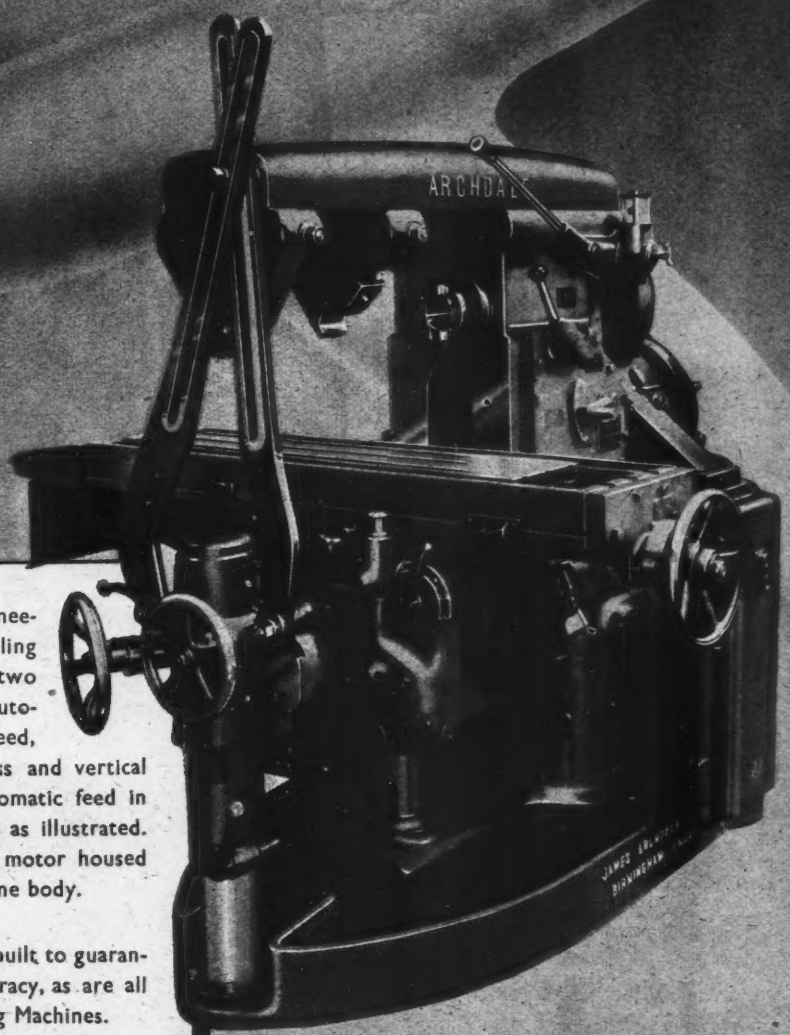
## AUTOMOBILE AND AIRCRAFT SERVICES LIMITED

**URGENT CAR SERVICE**

We can undertake urgent repairs or overhauls now. Write or telephone our West End Service Depot — 17 Berkeley Mews, Upper Berkeley Street, W.1. Tel.: Welbeck 5058. Service Depot also at 59/65, Belsize Road, N.W.6.

# ARCHDALE

## MILLING & DRILLING MACHINES




This is our largest knee-type Horizontal Milling Machine. Made in two forms (a) with automatic longitudinal feed, hand operated cross and vertical feeds (b) with automatic feed in all three directions as illustrated. Drive is by 6 H.P. motor housed in the machine body.

A robust machine built to guaranteed limits of accuracy, as are all Archdale Milling Machines.

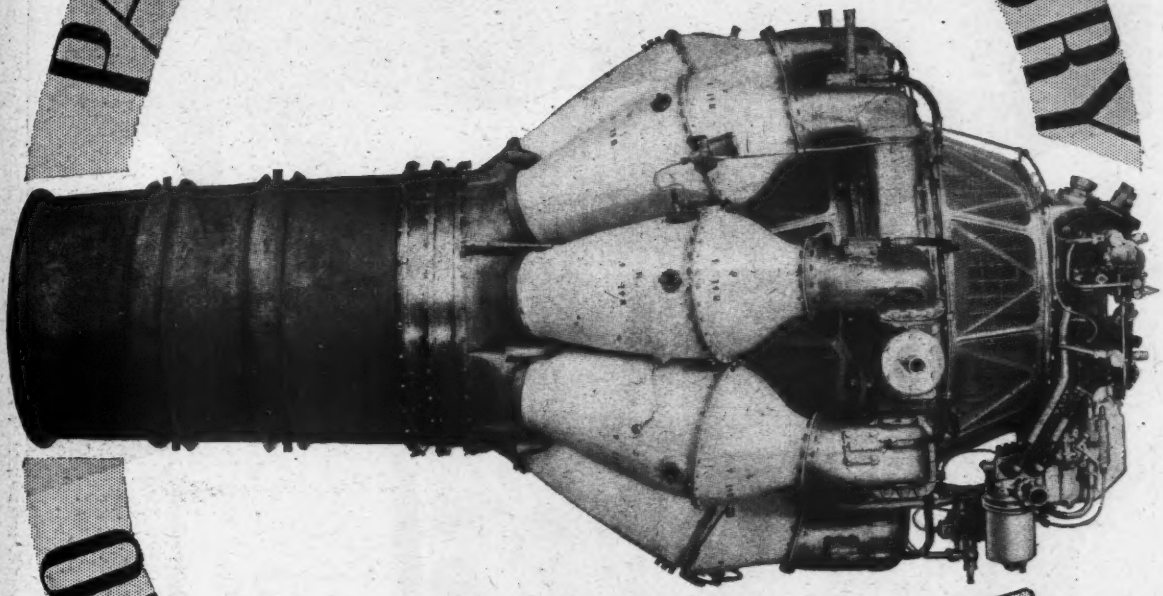
28" ALL GEARED HORIZONTAL MILLING MACHINE

**JAMES ARCHDALE & CO. LTD · Birmingham 16**

LONDON:
STAFFORD HOUSE, 40/43, NORFOLK STREET, STRAND, LONDON, W.C.2
Telephone Nos.: Temple Bar 7187 and 7188.

BIRMINGHAM:
53, VITTORIA STREET, BIRMINGHAM, 1
Telephone Nos.: Central 6801 and 6802.

PART OF THE INSIDE STORY



OF ROLLS ROYCE NENE

Only components of the highest possible standard are good enough for the world's most powerful JET ENGINE.

TECALEMIT are proud to have contributed a vital element to this, the most powerful jet engine in the world.

TECALEMIT

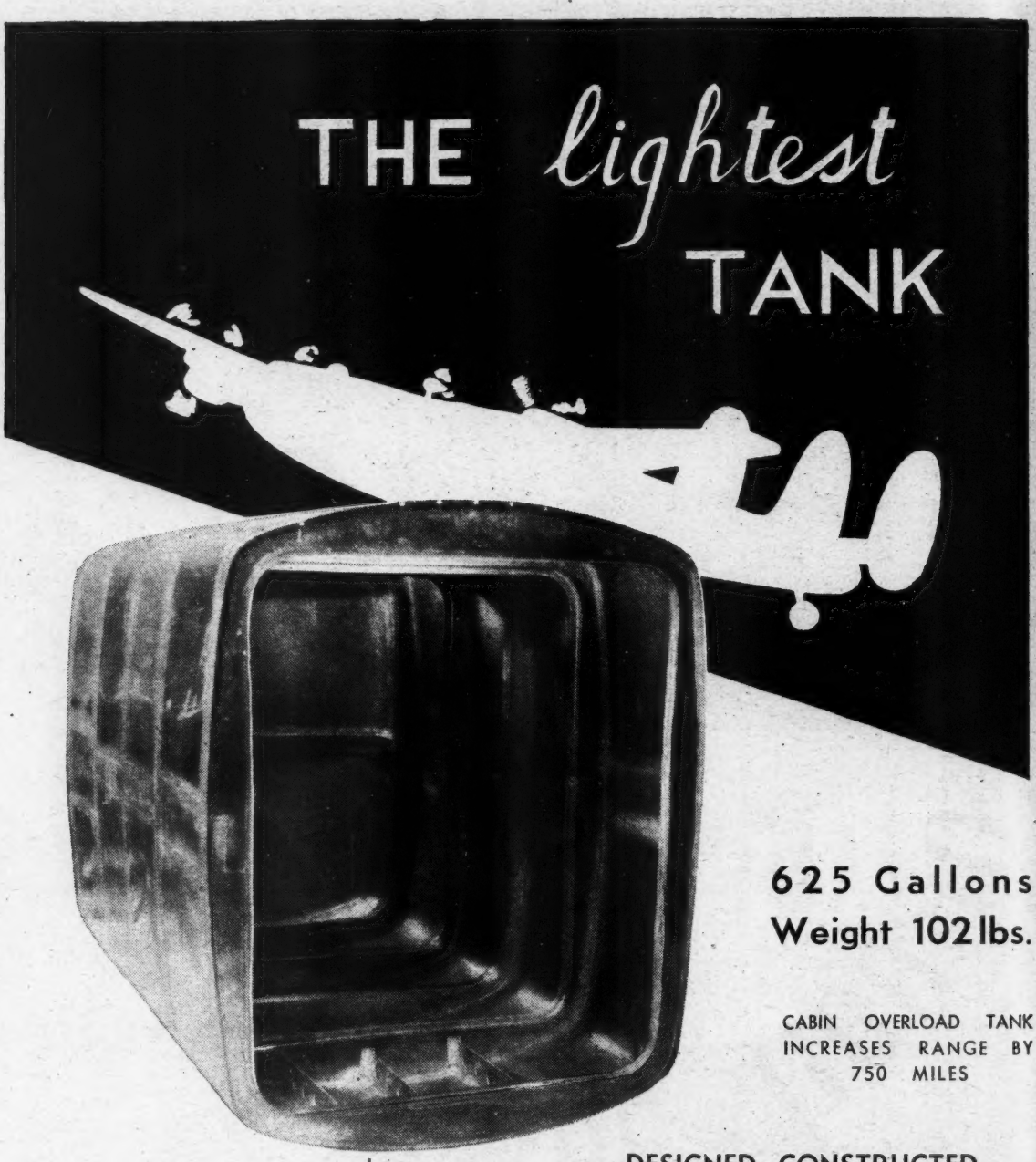
FUEL FILTER

Tecalemit Ltd., Great West Road, Brentford, Middx.
Hydraulic & Mechanical Designing & Manufacturing Engineers

Phone: EALing 6661 (16 lines)

AIRCRAFT DIVISION

# THE *lightest* TANK



**625 Gallons**
**Weight 102 lbs.**

CABIN OVERLOAD TANK
INCREASES RANGE BY
750 MILES

DESIGNED CONSTRUCTED
FITTED & FLOWN
IN 6 WEEKS

Fitted to V.I.P "York" aircraft of R.A.F. Transport Command, this tank has the lowest specific bare weight (·167 lbs. per gallon) of any fully factored aircraft tank.

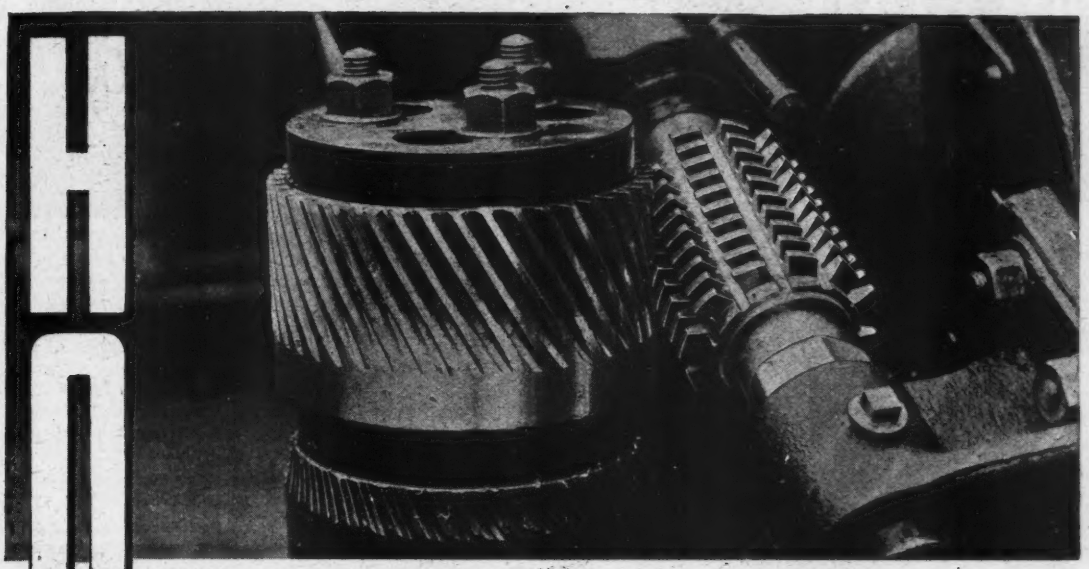
**We can save *you* weight, too—*at least* 30% of your present tank weight can be eliminated by the use of Magnesium tanks.**

*Specialists in Magnesium*

# ESSEX AERO LTD.

**GRAVESEND**

HOBS



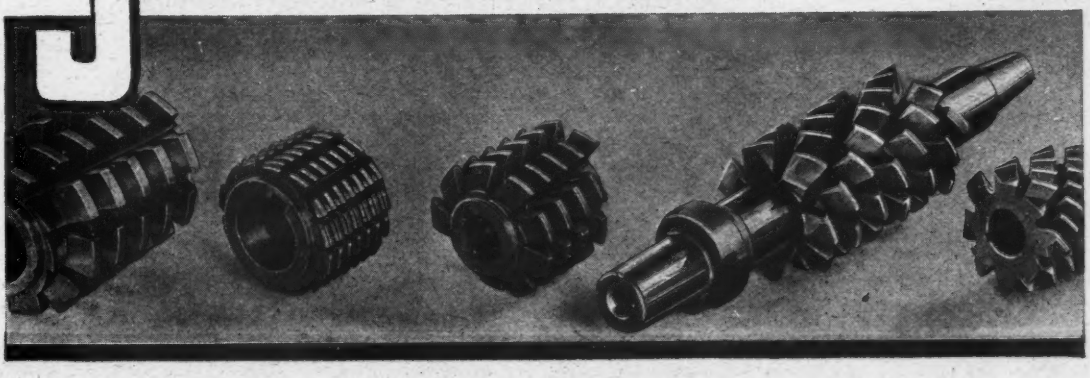
*Standard Hobs*

"David Brown" spur and helical gear hobs are super-hardened after form grinding to give accelerated production with maintained accuracy and all the sizes in most general demand are available either from stock, or at short notice, to generate either British Standard or Brown & Sharpe tooth forms. Detailed list available on request.

*Special Hobs*

We have excellent facilities for the accurate manufacture of special hobs of all types to customers' special requirements.

DAVID BROWN & SONS (HUDDERSFIELD) LTD



"GALEX" High Speed Milling Cutters, British Made by skilled labour, proved and tested as the best by experience.

Plain Milling Cutters, Helical Type Slab Mill, Side and Face Milling Cutters, Slot Milling Cutters, Angle Cutters, Shell End Mills, Morse Taper Shank, B & S Taper Shank and Straight Shank End Mills.

Milling Cutters of all types for early delivery.

Send all orders to Dept. (S.T.)

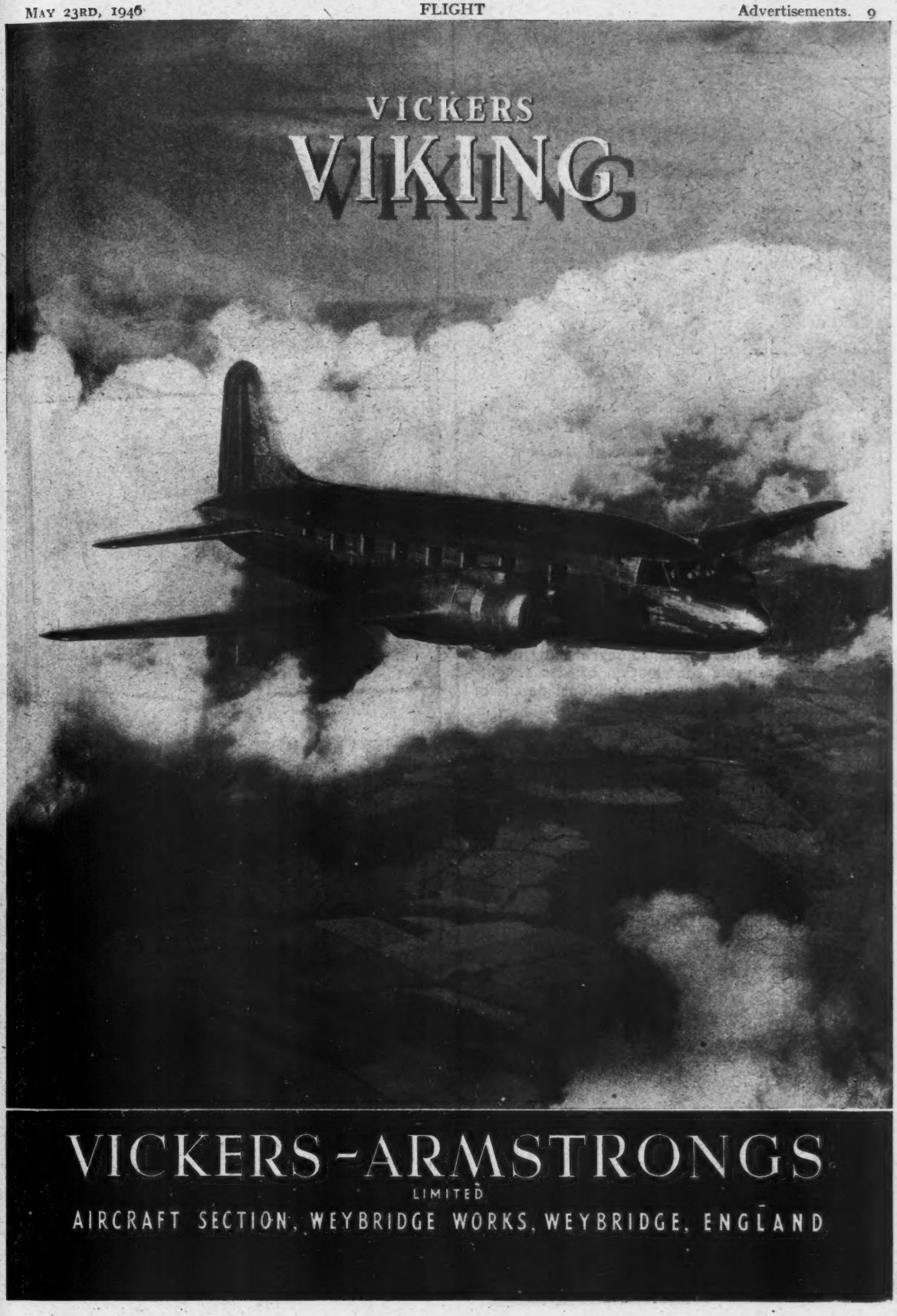
**GEORGE H. ALEXANDER**
**MACHINERY LTD.** 'PHONE: ASTON CROSS 3264-5-6-7 'GRAMS: "VIKING BIRMINGHAM" **BIRMINGHAM 4**

**GOOD DELIVERIES**

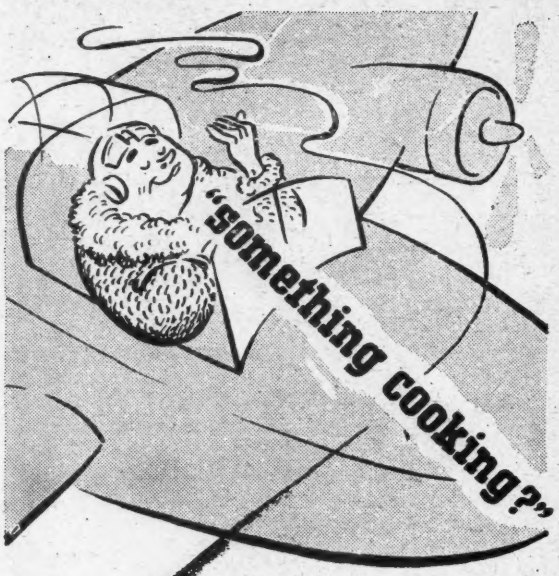
**JOHN LYSAGHT**
**LIMITED**
*Steel Sheets*
*Constructional Steelwork*

**BRISTOL · NEWPORT (MON) · SCUNTHORPE · LONDON**

7280-B




VICKERS-ARMSTRONGS
LIMITED
AIRCRAFT SECTION, WEYBRIDGE WORKS, WEYBRIDGE, ENGLAND




Yes, quite a lot in the development of LIGHT Alloy Kitchen Equipment made possible by use of REYNOLDS "Hiduminium" materials for Passenger Planes of leading Air Lines.

"Kitchens only?"

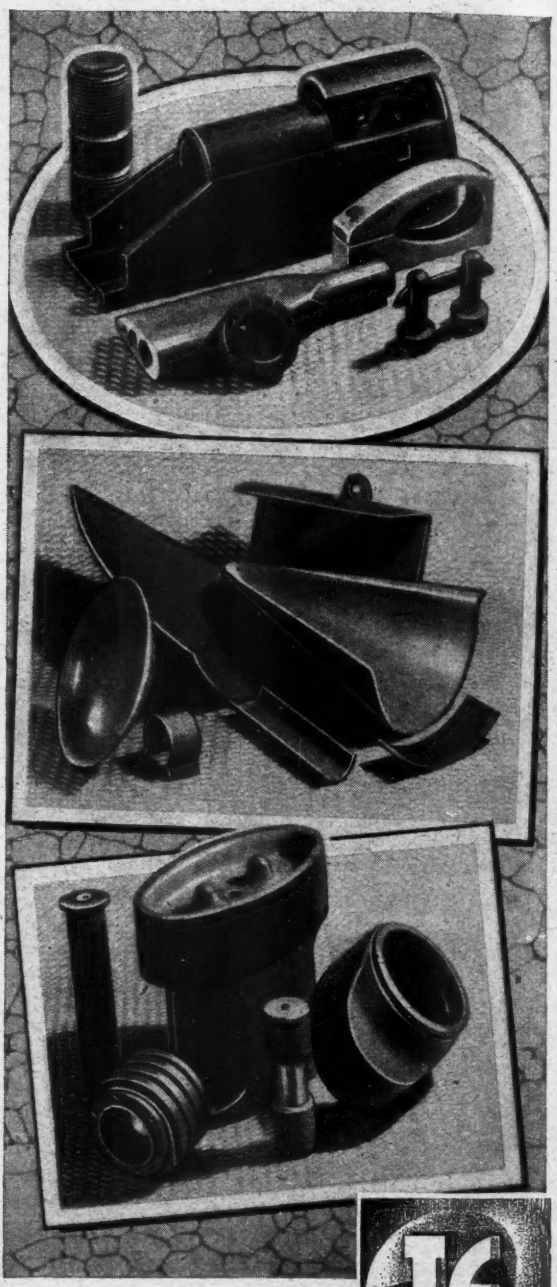
Not on your life—but for enhanced lightness and brightness of *all* Passenger Compartments, to say nothing of the valuable contribution of vast weight-reduction in constructional details of the Plane itself.

REYNOLDS Light Alloy Materials served the aircraft of Britain and her Allies during the days of War. Like Britain, they are tough, and will prove equally invaluable in the days of Peace ahead.

*Write Reynolds now for "constructive" suggestions on the way Light Alloys can add additional "wings" to Aircraft design.*

REYNOLDS

REYNOLDS TUBE Co. Ltd. (Light Alloy Division)
BIRMINGHAM 11.



For the latest technique in laminated plastic . . . . MACHINED COMPONENTS, BUSHES & BEARINGS, FORMED PARTS, STAMPINGS & GEARS take advantage of "I.E." Ingenuity and Experience.

I.E. LAMINATED PLASTICS

INSULATION EQUIPMENTS LTD.
ERDINGTON, BIRMINGHAM, 23

# Leytool RATCHET SPANNERS

A.I.D. Approved 793672/38.

**INDISPENSABLE FOR SERVICE TOOL KITS**

**ESSENTIAL FOR ASSEMBLY LINES . . .**

The "Leytool" Ratchet Spanner is an essential aid to speed and ease in installation, assembly and servicing work. It saves time and money. It is four times faster than ordinary spanners, and gets into those awkward places where other spanners will not go. Made of carbon chrome steel, hardened all over, it is of great mechanical strength, and is the finest ratchet spanner made. Available in a number of stock sizes.

| HEXAGON SIZES | | |
|---|---|---|
| Standard Nut | Wrench Size | Width A/C Flats |
| 0BA | 1 | .413" |
| 1BA | 1 | .365" |
| 2BA | 1 | .324" |
| 3BA | 1 | .282" |
| 4BA | 1 | .248" |

| | | | |
|---|---|---|---|
| ¼" | WHIT. | 1 or 2 | .448" |
| 17/64" | ,, | 2 | .525" |
| 9/32" | ,, | 2 or 3 | .600" |
| 5/16" | ,, | 3 | .710" |
| 11/32" | ,, | 3 | .820" |
| 3/8" | ,, | 3 | .920" |
| 13/32" | ,, | 3 or 4 | 1.010" |
| 7/16" | ,, | 4 | 1.100" |
| 15/32" | ,, | 4 | 1.200" |
| ½" | ,, | 4 or 5 | 1.300" |
| 17/32" | ,, | 4 or 5 | 1.390" |
| 9/16" | ,, | 5 | 1.480" |
| ⅝" | ,, | 5 | 1.670" |

| | | | |
|---|---|---|---|
| ¼" | BSF | 1 or 2 | .448" |
| 9/32" | ,, | 2 | .525" |
| 5/16" | ,, | 2 or 3 | .600" |
| 11/32" | ,, | 3 | .710" |
| 3/8" | ,, | 3 | .820" |
| 7/16" | ,, | 3 | .920" |
| 15/32" | ,, | 3 or 4 | 1.010" |
| ½" | ,, | 4 | 1.100" |
| 9/16" | ,, | 4 | 1.200" |
| ⅝" | ,, | 4 or 5 | 1.300" |
| 1" | ,, | 5 | 1.480" |
| 1⅛" | ,, | 5 | 1.670" |

| SQUARE SIZES | |
|---|---|
| Wrench Size | Width A/C Flats |
| 1 | .250" |
| 1 | .313" |
| 2 | .375" |
| 2 | .438" |
| 3 | .500" |
| 3 | .625" |
| 3 | .750" |
| 4 | .875" |
| 4 | 1.000" |
| 4 or 5 | 1.125" |
| 5 | 1.250" |

*Write for illustrated pamphlet showing the full range of standard sizes, and prices.*

AS SUPPLIED TO ALL SERVICE GOVERNMENT DEPARTMENTS.

**Distributors' enquiries invited for Home and Export trade.**

# Leytool PRECISION HAND DRILL

Patent No. 2098744

This entirely new Hand Drill Brace is a noteworthy improvement in design on all previous hand drills. Well balanced, with a comfortable hand grip which fits snugly into the hand, it is compact in size, can be carried in the pocket, and is positively a pleasure to use. The standard of manufacture is equal to a high-grade precision tool for accuracy.

**Solid one-piece die-cast body.**

**All gears accurately cut and totally enclosed, requiring absolute minimum of exertion. (Maximum power is obtained by rotating slowly.)**

**Accurate self-centring chuck.**

**Takes drills up to ¼-inch diameter.**

**Chuck spindle and jaws are hardened and tempered to resist wear.**

**Self-lubricating bearings, obviating necessity for oiling.**

**Ball thrust race takes the drilling pressure.**

*Write for fully descriptive leaflet.*

*Manufactured by*

# Leytonstone JIG & TOOL Co. Ltd.

606, HIGH ROAD, LEYTON, LONDON, E.10

*Phone: Leytonstone 5022-3.*
*Telegrams: "Leytool, Leystone."*

*Specialists in*

**JIGS & FIXTURES**
**PRESS TOOLS**
**AIRCRAFT ASSEMBLY JIGS & REFERENCE GAUGES**
**PLASTIC MOULDS**
**CAPSTAN LATHE WORK**
**DESIGNS & DRAWINGS**
**SMALL ASSEMBLY HAND TOOLS**

# 8 out of every 9 British Naval Aircraft were Fairey types

No fewer than eight out of every nine operational aircraft of British manufacture that were delivered to the Royal Navy from all sources in the War were Fairey types.

To-day, the Fairey Firefly is officially cited as "the standard two-seat Fighter Reconnaissance Aircraft in Naval Service." It equips squadrons of the Royal Canadian Navy and the Royal Netherlands Navy.

The Mark IV version is now coming off the production lines.

**THE FAIREY AVIATION COMPANY, LTD., HAYES, MIDDLESEX**

FLIGHT
and
AIRCRAFT ENGINEER

Editorial Director G. GEOFFREY SMITH, M.B.E.
Editor - - C. M. POULSEN
Assistant Editor - MAURICE A. SMITH, D.F.C. (WING CDR., R.A.F.V.R.)
Art Editor - - JOHN YOXALL

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

Editorial, Advertising and Publishing Offices: DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1
Telegrams : Flightpres, Sedist, London. Telephone : Waterloo 3333 (50 lines.)

COVENTRY: 8-10, CORPORATION ST. Telegrams : Autocar, Coventry, Telephone : Coventry 5210.
BIRMINGHAM, 2: KING EDWARD HOUSE, NEW STREET. Telegrams : Autopress, Birmingham. Telephone : Midland 7191 (7 lines).
MANCHESTER, 3: 260, DEANSGATE. Telegrams : Iliffe, Manchester. Telephone : Blackfriars 4412.
GLASGOW, C.2: 26B, RENFIELD ST. Telegrams : Iliffe, Glasgow. Telephone : Central 4857.

SUBSCRIPTION RATES : Home and Abroad : Year, £3 1 0. 6 months, £1 10 6.

Registered at the G.P.O. as a Newspaper

No. 1952. Vol. XLIX. May 23rd, 1946. Thursdays, One Shilling.

# The Outlook

## Rocket Power for Aircraft

TECHNICALLY the rocket-propelled Me 163 intercepter, discussed together with other rocket fighters in this issue, was one of Germany's most creditable achievements. Tactically its value was never proved, due principally to shortage of concentrated hydrogen-peroxide, hydrazine-hydrate and methanol for its Walter rocket. Willy Messerschmitt regarded it as an unwelcome and unpromising stepchild, left on his doorstep by Lippisch, and fumed at its adoption; his own conception of a target-defence intercepter was an Me 262 with one or two auxiliary rockets giving a rate of climb of over 9,000 ft/min.

The prospects for this class of aircraft, lately discussed by Mr. W. G. Carter, were considered by the Germans to be such that development of pure-rocket fighters with their severely restricted endurance was slackened, but, significantly, rocket power was specified for at least two prototype aircraft of exceptional interest. The first (D.F.S. 228) was a pick-a-back-launched reconnaissance machine to operate between 60,000 and 80,000ft and capable of protracting its endurance by glides and zooms; the second (D.F.S. 346) was intended solely for supersonic research flying. Likewise launched by a parent aircraft the 346 had twin rockets and it was hoped to develop it for flight at Mach 2.6 at 100,000ft (1,700 m.p.h.). The pilot lay prone in a jettisonable pressure cabin and special precautions were taken to protect him from the heat developed by skin friction.

For aerodynamics research machines such as the 346, propulsive rockets offer tremendous thrust for small size and weight at the expense of heavy, but acceptable, fuel loads. The turbine jet is not yet a serious competitor in this field, though the athodyd (ram jet or propulsive duct) may eventually be preferred for certain purposes. Whatever the ultimate application of the rocket power for aircraft, the time is ripe for the fullest investigation of its possibilities.

## Why Helicopters?

ANYONE who has examined the mechanisms of a helicopter might well wonder if all this complication is really going to lead us to the desired goal. The transmission to the main rotor is an involved and highly-stressed piece of ironmongery. In addition there is, in most single-rotor types, an airscrew at the back, the sole purpose of which is to counteract the torque of the main rotor and give directional control. It is driven through a long shaft with universal joints, and the pitch control for it has to run the whole length of the fuselage.

All this spells weight and cost, and it does appear that the small helicopter for two or three people will, on this account, always be very expensive to buy and will require a lot of maintenance. In the larger class these objections may not be quite so serious, because these machines will, presumably, be used for commercial work and thus have a chance of earning their keep. But for the private owner these considerations will be all-important.

In the somewhat unwarranted enthusiasm for the helicopter, the airscrew-propelled type with "windmilling" rotor seems to have come to be regarded as a back number. But is it? What does the helicopter have to offer which such types as the jump-start Cierva Autogiro and the Hafner Gyroplane cannot achieve? It can rise vertically and descend vertically, while the others do need a certain amount of forward speed.

This advantage *looks* very attractive, but in practice it is not nearly so great. The most dangerous period of a helicopter's flight occurs during vertical ascent in still air. If the engine should stop before a height of 200--300 ft has been reached, there will be what Mr. Hafner recently termed "a discontinuity in the flight path"! No matter how quick the pilot is in getting his rotor into fine pitch for autorotation, the machine will hit the ground before it can gain sufficient forward speed. Thus the vertical ascent in still air should only be under-

taken as an emergency and not as ordinary procedure. The normal take-off will be a slanting one. The Cierva and Hafner "jump-starters" needed no ground run, and their angle of climb was sufficient for most surroundings.

It is, of course, true that these machines had to have transmission in order to run-up the rotor to above its normal speed, but it was in use for very short periods only, not continually as in the helicopter, and thus it may be assumed to have much longer life than the helicopter transmission, apart from being much lighter. In the small sizes there may be something to be said for reconsidering this type.

## Volunteers for the R.A.F.

OF all the Services the R.A.F. is at present feeling the draught—or lack of it—the most. Every Command is handicapped by the continuous change and drain of key personnel resulting from demobilization and for overseas units from repatriation as well. There is little doubt that many months must elapse before any stability can be achieved, and until it is, the majority of units must work under considerable difficulties and at reduced efficiency.

The aim of 3,000 recruits per week for the R.A.F. from now until the end of the year will not be an easy one to realize. The requirement, some details of which appear on page 510, is chiefly for skilled tradesmen, preferably with wartime experience of the work to be done, and although conditions of service and rates of pay have been made a little more attractive, there does not seem to be any great enthusiasm for them. A good craftsman is worth good pay at any time, anywhere, and at the moment such men are at a premium. It is very doubtful whether sufficient incentive has yet been given to the type of men the R.A.F. needs, either to make those still serving wish to sign-on for a further period of service or to attract back into uniform those already demobilized. It is likely that many will be driven to reassume uniform and the simplicity of service life, in order to escape from the comparatively chaotic existence of the house-less, coupon-ridden, queue-plagued civilian.

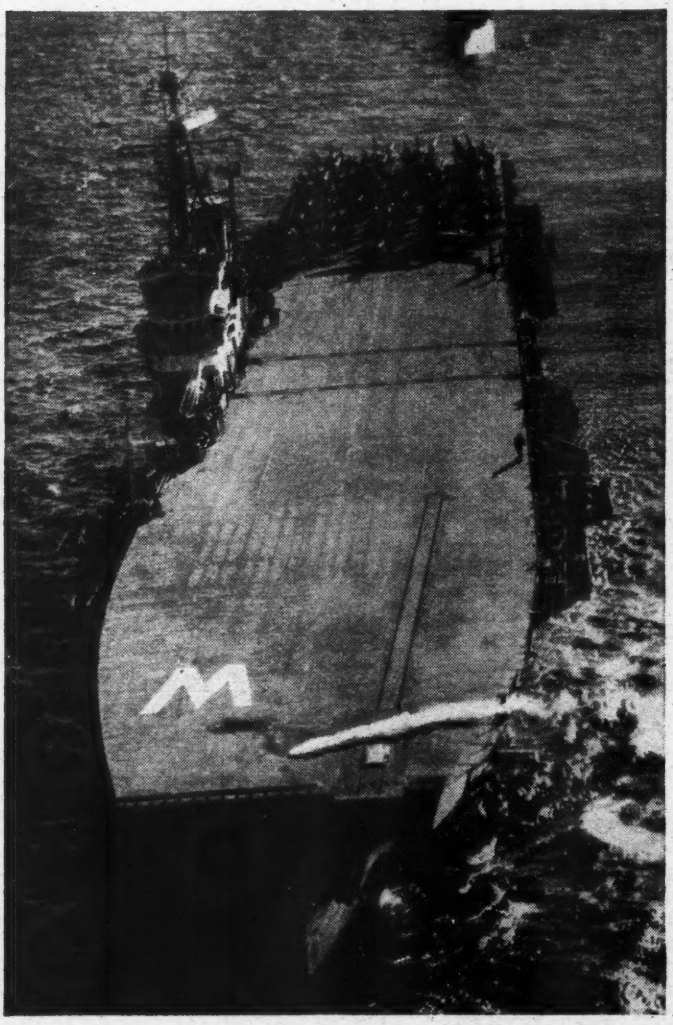
CONTENTS


| | |
|---|---|
| The Outlook | 507 |
| Actuarial Digression | 509 |
| Jameson Aero Engine | 511 |
| Here and There | 515 |
| Water Injection | 517 |
| Rocket Fighters | 519 |
| Civil Aviation | 524 |
| Civil Aircraft in France | 527 |
| Correspondence | 530 |
| Service Aviation | 532 |


## The Reserves

NO fighting force can be considered complete without adequate reserves, this is old stuff. The decisions with regard to Reserve and Auxiliary squadrons will now be watched with the greatest interest, for while many ground and air crews are unwilling to give full time to the R.A.F. there are undoubtedly very large numbers desirous of devoting evenings and week-ends to such work and anxiously awaiting news of how and under what conditions it can be done.

A possible solution to the ground crew, servicing and routine organization problems which must be anticipated in connection with Reserve flying would be to make flying for all air crews, who will certainly preponderate among the applications for Reserve service, provisional upon qualifying for and giving a fair proportion of time to essential ground duties. This would serve the double purpose of assuring a reserve of officers and N.C.O.s capable of adapting themselves to flying or ground duties at short notice as requirements dictated, and help to avoid a repetition of the embarrassing administrative weaknesses of many wartime aircrew officers and N.C.O.s.



**READY FOR TAKE-OFF: Supermarine Seafires and Fairey Fireflies parked on the flight deck of H.M.S. *Warrior* off Halifax harbour. The 18,000-ton vessel is the first aircraft carrier and capital ship to be commissioned in the Royal Canadian Navy.**

*"Indicator" Discusses Topics of the Day*

# Actuarial Digression

## *The Insurance Angle on Big Aircraft : Bad-weather Traffic Dilemma : Range versus Endurance*

A YEAR or two ago, in the course of my periodic unburdenings, I suggested in all seriousness that, if civil aviation were to be left entirely to itself, it would eventually be almost entirely controlled by insurance interests. Which might or might not be a bad thing. At least we should see results in direct proportion to values offered and needs fulfilled. Now, with the nationalization and internationalization of air transport, we shall never know in what form it might finally have survived the agonies of the natural world of supply and demand.

But the simple bookmaking rules of insurance, in which the many club together and agree to pay for the misfortunes of the few, must inevitably begin to affect the issue as transport aircraft sizes increase.

During recent months there has been a good deal of discussion here and there about the value or otherwise of the development of very large civil aircraft. Their importance from the technical and prestige angles has been stressed on the one side, and their difficulties from the passenger-handling point of view on the other, but, so far, nobody appears to have considered the effects of the use of such aircraft on future personal insurance rates or on all-weather operating efficiency.

To some extent these two points are related. One of the arguments used by the average airline operator is that, with high-speed transport, it is better to run a number of medium-sized aircraft at high frequency rather than to fly really big aircraft at longer intervals. Not only is the prospective passenger likely to prefer it, but the airfield facilities are better able to cope with a more or less steady stream of passengers than with a sudden inrush, say, once every few hours. But, at least in typical European weather conditions, this advantage will possibly be lost when the weather is anything but near-perfect.

### QBI Conditions

While, in theory, it is pleasant to think of six 30-seaters arriving at ten-minute intervals during the hour, on a very large proportion of the days of the year most of these six aircraft would be stacked up over the terminal while the crews waited for their turn to land. In conditions which are covered by the code letters QBI, and even with present-day bad weather-approach facilities, it is unlikely that an arrival frequency much greater than four aircraft an hour can be considered at any one airfield. Consequently, the services would need to be severely curtailed, and it would then be better if each of the few aircraft in use were to carry as many passengers as possible. Naturally enough, the large aircraft might, by its very nature, be rather more of a handful for the crew in such weather conditions, but, even so, the additional time required to make a safe approach with it would be very much less than that needed to bring in two transports of half the size.

Here, however, we should probably find ourselves running into the insurance problem—insurance not so much of the aircraft itself, expensive though that might be, but of all the individual passengers whose dependents and relatives must be satisfactorily protected. An actuary will no doubt be able to put me right, but it seems to me that, with certain accepted risks of transport, the individual premium must necessarily increase in proportion to the number of bodies subjected, at the same time, to any particular risk. If we take, in explanation, an extreme case, we might compare the overall risks accepted by insurance companies with a hundred millionaires all travelling in separate aircraft (any one of which might suffer an accident) with those accepted when these same millionaires all travel in single aircraft which is subject to the same risks as each of the individual aircraft. Whereas the insurance people might, in the first case, be liable to pay off the dependents of one or two millionaires, in the second case they might find themselves in the position of having to pay the dependents of a hundred of them. In the first, the chances of accident is greater but the possible losses smaller, while, in the second case, the accident is less likely but the possible losses immense. It is simply another form of the old question of how many eggs one should place in one particular basket.

### Large-Size Maintenance

From the operators' point of view much the same relative risk must be taken in the matter of day-to-day serviceability. It can be assumed that the larger the aircraft the greater is the likelihood of a minor fault which would cause the aircraft to be taken off service. Consequently, if an operator has the choice, he would much prefer to run, say, a hundred 30-seaters rather than thirty 100-seaters. Whereas the unexpected grounding of one of the hundred might be troublesome, the same difficulty, when there is only a fleet of thirty on which to draw, would be very much more serious and might even cause the services to be completely disrupted.

So it would seem that the advantages and disadvantages of the really big aircraft are, in the present state of navigational and technical development, just about equal. While it is undoubtedly a good thing to proceed with the development of big aircraft—in the interests of technical exploration and so that we can all be ready when the need for such large transports becomes obvious—the real future depends on so many interrelated factors that it is impossible to feel confidence one way or the other. One gathers that, in America, there are signs of a reaction from size-increase and a tendency to concentrate on transports in the 30-40-seater size which, at the moment, provides the best all-round compromise.

### Range, Time and Distance

Meanwhile, in the present and still somewhat static stage of bad-weather flying technique, I suspect that people are being a shade optimistic when they think too volubly in terms of the near-future use of 500 m.p.h. pure jet transports. We know that there is no insuperable difficulty about developing such aircraft, and that, at such cruising speeds, the range will compare more than favourably with that of conventional piston-engined types flying at a lower cruising speed.

Even so, having made a four-hour run across the Atlantic, it will still be necessary for the aircraft to be put down somewhere, weather or no weather, and it will certainly not be possible for it to loiter around at low speeds while waiting for a turn to land at a weather-bound terminal. The fact that the jet transport's endurance will be considered only in terms of range at high speed means that the crew will have a much wider scope in the choice of alternative airfields, but decisions will need to be made rapidly. The safety margin will certainly need to be no less, in proportion, than at present considered to be reasonable, and, though the endurance in terms of range will offer a wide airfield choice, it may have considerable disadvantages where the passenger is concerned. It will be nice to know that, if the aircraft cannot be brought in at Heathrow, it can be flown in a matter of an hour or so to Prestwick, or in half an hour to Valley, Anglesey, but the London passengers may not much want to be put down

## ACTUARIAL DIGRESSION

in Scotland or Wales. Since weather questions will, therefore, need more careful consideration, the saving in time may not, after all, be so very much greater.

Everything points to the obvious need, before really fast transports can reasonably be put into regular operation, of at least an equal advance in bad-weather arrival technique and in standards of navigational safety generally. I do not suggest that these transports of the future will necessarily have very much higher approach and landing speeds than those to which we are at present accustomed, but it may no longer be practicable to loiter at a stipulated height while waiting for a landing turn, or to make two or three abortive attempts at an approach. After loitering, say, for half an hour over the originally proposed arrival point, there might be inadequate range available to reach an alternative field.

# Recruiting for the R.A.F.

### *Details of Peacetime Requirements of the Service*

AN announcement from the Air Ministry concerning Royal Air Force recruiting requirements indicates that to maintain an efficient and balanced Air Force, 100,000 men on regular engagements are needed by December 31st, 1946. This entails the enlistment from civil life of regular servicemen at a rate of 3,000 a week from now until the end of the year. Conscription alone cannot provide either the skill or the numbers required, and the length of training for many of the trades would make it uneconomical to use conscripts; in addition, stability cannot be maintained when men are constantly changing.

At present there are more than a hundred separate trades open to recruits from outside the Service or from among those who have served and have been released. The great need at present is for skilled or semi-skilled men for technical and maintenance trades, and for men experienced or suitable for training in the administration branch. Those who are only semi-skilled or even unskilled will be given the opportunity of training. Men with only elementary education can enlist as aircraft hands and may have a chance later to receive training in a skilled trade. A two-fold recruiting plan has been devised.

. . . . 100,000 men wanted by December 31st, 1946.
. . . . more than 100 trades open to recruits.
. . . . £25 initial bounty and terminal gratuity of £25 for each year of service
. . . . no definite age limit laid down for extended service engagement.
. . . . qualification for a pension is 22 years or over.

Under the extended service or "bounty" scheme, experienced men, either released or still serving, may re-engage for three or four more years, provided they have had two years' mobilized service, and later, if they wish, they may volunteer for long-term engagements. In addition, there is a subdivision of this scheme which will permit men already serving on a regular engagement which will not expire until the scheme is closed, to sign-on for a further three years' service with comparable gratuities.

An initial bounty of £25 and a terminal gratuity of £25 for each year of service will be granted to men enlisting under this scheme, and at the end of their period of service they will receive a civilian suit and 28 days' leave, while those who enlist prior to their release will receive immediately a civilian suit (or £8) and the equivalent to 56 days' release leave. The bounty and gratuities will not be subject to tax. For extended service engagement there is no definite age limit laid down, but normally eligibility will be up to a man's 41st birthday.

Men who continue in or return to the Service under the scheme will be given the temporary rank they hold or held on discharge, and those returning to the Service will be considered for the grant of substantive rank after they have served for three months. Those who accept the scheme before release will be considered for the grant of substantive rank immediately.

The scheme for engagement from civil life is a continuation of the normal peacetime recruiting, and applications are sought from candidates aged 17½ to 33 years. They may enter as fully-skilled in a trade or as semi-skilled or unskilled to undergo training in any trade they choose. The minimum periods of service for skilled ground trades is 10 years' regular service and two years on reserve, with the possibility of re-engagement to complete time for a pension. For other trades, engagement is for five years, also with a possibility of extension for a pension. The qualification for a pension is service for 22 years or over, and the amount of pension varies according to rank and total length of service. Men completing 10 years' service will be eligible for a terminal gratuity of £50 and an annual gratuity of £25 for each year of subsequent service up to a maximum of £200, all being tax free.

The new pay codes come into operation as from July 1st, and ground trades will be classified in four trade groups instead of six as at present. The wage offered is broadly equivalent to that which would be expected from a similar job in civilian life, and particular advantages include 28 days' paid leave a year; free medical and dental attention; and special facilities for education and sport.

Applications for aircrew are not required at the present time, and recruiting for R.A.F. Reserve Command, including the Volunteer Reserve, Auxiliary Air Force, A.T.C. and Royal Observer Corps, will be undertaken as a separate commitment for which details will be announced later.

## FAR EAST A.O.P.

NO. 656 (Air O.P.) Squadron, R.A.F., now operating in Java, holds the distinction of having been the only squadron of its type ever to operate east of Calcutta. It has been in action almost continually in its function of "Air Observation Post," spotting for the artillery since the beginning of 1944, when it arrived in Burma.

The squadron was formed at the end of 1942 at Bury St. Edmunds, disembarked at Bombay in September, 1943, and in January, 1944, moved into the area of the 14th Army. Within a few days the aircraft were in action, and when 114 Brigade was surrounded east of the Kalapanzin, the Auster was for ten days its only link with Corps H.Q., flying in operation orders and medical supplies daily.

In April, 1944, the squadron inaugurated night observation flights with such success that, despite the lack of navigation lights or blind flying instruments on the aircraft, and landing strips lit by hurricane lamps, they became a regular feature. By May, however, monsoon weather made forward strips unusable even for Austers, and by June both "A" and "C" Flights had to be withdrawn. Not till August, however—when the fabric covering of the aircraft was rotting away with the continuous rain—did "B" Flight pull out of the Imphal Valley.

By mid-November the squadron was in action over a 320-mile front, supporting every division of 14th Army and 15 Corps, and by May it had flown 6,712 sorties in 5,708 flying hours, and spotted for 2,870 "shoots," many of which would have been impossible or useless with ground observation alone.

## WOMEN IN WAR

ON Wednesday, May 8th, Miss Pauline Gower, M.B.E., previously in charge of the women's section of the A.T.A., told the London Branch of the Women's Engineering Society the story of the A.T.A. and of the "battle for recognition" fought on behalf of women pilots. At first, even after the point had been conceded, only a few women pilots were admitted to the A.T.A., but, as the need for ferry pilots increased, their numbers steadily rose and they were eventually allowed to ferry not only fighter and medium bomber aircraft but even four-engined bombers—complete, sometimes, with a woman flight engineer.

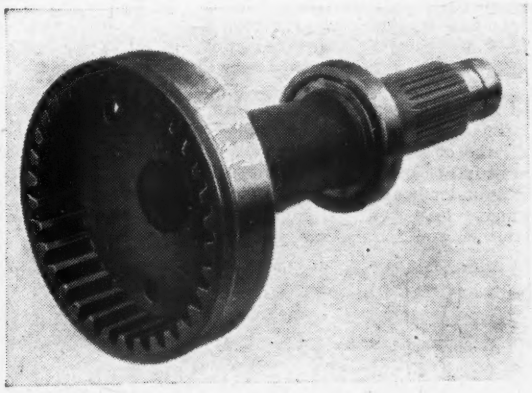
Miss Gower disclosed the fact that when aircraft were desperately needed for Malta, it was the Women's Ferry Pool at Hamble which rushed some 90 per cent of the machines to the waiting aircraft carriers, on which they were taken to the island. She added that an average of twenty women pilots at Hamble had ferried 23,000 aircraft in four years.

# JAMESON AERO ENGINE

## *New British Flat-four with Remarkable Performance : Heterodox Induction Combined with Ingenious Design Features*

TO-DAY, when the gas turbine is supplanting the conventional piston engine as the most powerful unit for aircraft propulsion, one is inclined to regard the reciprocating engine as something of a "has-been," except on the score of fuel consumption. It is generally accepted that the higher the power output of an engine the lower its specific fuel consumption can be brought down and this postulate would thus appear to make it quite hopeless to try to produce a 100 h.p. engine with a lower specific consumption than that of a 2,500 or 3,000 h.p. unit. Such, however, has been achieved in a new flat-four light-aircraft engine developed by Jameson Aero Engines, Ltd., of Ewell, Surrey. In point of fact this engine is capable of lower normal specific consumption figures than have ever before been attained.

As an engine, the physical design and layout conforms to accepted flat-four practice, but, apart from the unusual induction system rendered necessary for the exploitation of the designer's theory, there are also other unconventional detail features, most of which are directly traceable to the influence of machine tool design—this being understandable when it is appreciated that the Jameson company are specialist machine-tool designers.



**Airscrew shaft showing internally toothed reduction-gear bell annulus, and front thrust bearing.**

The Jameson induction theory is based on the premise that turbulence is a disadvantage and that, on the contrary, a progressive stratification in mixture strength is to be desired. It occurred to the designer that if it were possible to arrange the induction system in such a way that the ingoing charge in the induction pipe consisted of alternating rich and weak mixtures, it would perhaps be possible, by incorporating a suitable device in the manifold in conjunction with a cylinder head designed to give minimum turbulence, so to arrange matters that the rich portion of the inducted charge should enter the combustion chamber last. Thus the charge in the cylinder would consist of an extremely weak mixture adjacent to the piston crown, progressively increasing in density up to a lodgement of rich mixture around the sparking plug—this progressive stratification in density of mixture obtaining at bottom dead centre of the induction stroke and, owing to the designed suppression of turbulence, continuing to obtain during the compression stroke.

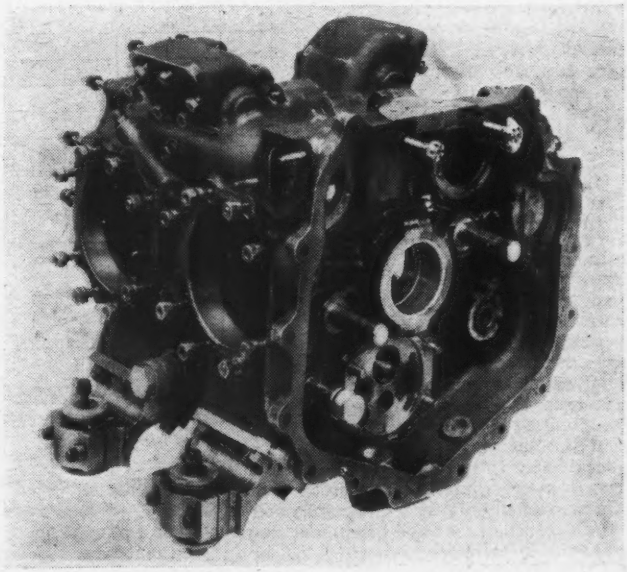
On firing, the rich mixture would be combusted, and so bring about a pressure propagation through the weak strata, allowing them to be ignited—the rate of pressure propagation always being in excess of the flame rate. In other words, whilst part of the charge was expanding, the remainder would be undergoing its compression cycle and burning at a rate more or less relative to the rise in pressure; thus the engine would be capable of adjusting its own rate of compression to suit the mixture strength as it burnt.

Consonantly, the normal indicator diagram would be distorted, the peak of pressure being cut off and the curve of pressure period being moved to the right, this modification in entropy giving a somewhat greater enveloped area than normal. The reduction in peak amplitudes of pressure and the increase of the pressure period (the latter being due to the sustained burning of the charge) would combine to reduce the "impact" loads throughout and, at the same time, to give very smooth running characteristics, almost irrespective of throttle opening. It was also thought that these conditions would eliminate detonation, even if the nominal compression ratio were somewhat higher than that required to burn the richest mixture.

### Proving the Theory

Miles Aircraft, Ltd., suggested that Mr. Jameson should design and construct a prototype flat 4-cylinder engine of between 100 and 120 h.p., and he decided to apply his theories to this venture. The engine is of 3.28 litres and is fitted with a reduction gear of 0.619:1. On running trials a two-bladed airscrew from a standard 150 h.p. engine was fitted, this being capable of absorbing about 120 h.p. at 2,150 r.p.m., which corresponded to 3,500 r.p.m. through the reduction gear.

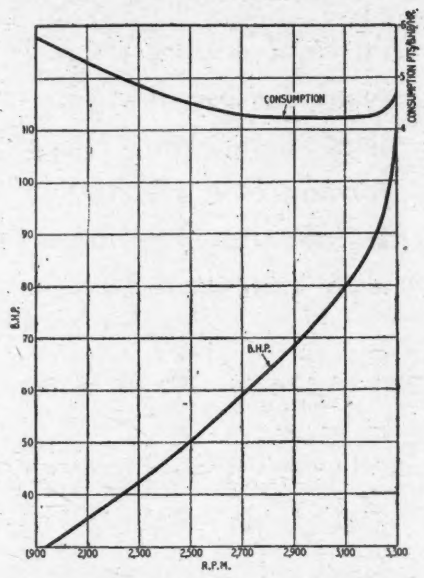
The engine was obviously very rich with the conven-



**Three-quarter rear view of crankcase. The bearing feet shown are for dynamometer work and a different arrangement would obtain for an aircraft installation.**

tional carburettor setting, and some time was spent in drilling-out air bleeds to obtain regular running; in fact, the main diffuser was eventually opened out to something over double its original diameter before smooth running was obtained. The Zenith carburettor was sent back to the makers, who reported that the fuel/air ratio was over 20:1, and they failed to see how an engine could function burning such lean mixtures. They returned the carburettor and, with the assistance of a Zenith technician who brought more jets and chokes, 3,500 r.p.m. was obtained with the engine running very smoothly.

After several hours' running it was decided to fit thermocouples under the plugs and maintain 90 per cent throttle at 3,300 r.p.m. until temperatures reached 250 deg. C. However, after 45 min. the temperatures had not reached 220 deg. C, and the engine was stopped. It was then decided to test the engine with flow meter, using a calibrated flask; the consumption worked out at exactly 0.4 pt/b.h.p./hr.




**These curves show the consumption characteristics against power output and indicate the optimum as being well-up on the power curve.**

This was reported to the Director of Engine Development, who authorized a 100-hour development test. The engine was coupled to a DPX4 hydraulic dynamometer and run for periods up to seven hours at 90-92 h.p. with different carburettors and settings. At about 50 hours, the original flat-crown pistons were replaced with domed pistons giving the same compression ratio, with the object of introducing turbulence to upset the stratification. It was at once apparent that the general behaviour of the engine had changed for the worse; richer mixtures were required to maintain even running; the best consumption obtained was 0.46 pt/b.h.p./hr; cylinder head and exhaust temperatures had increased, and, in spite of necessary mixture enrichment, there was no appreciable increase in power.

### Official Results

The engine has been run on 80, 87 and 100 octane fuel, and the only perceptible difference is in ignition timing, which, in turn, has only a small effect on consumption when using the leanest mixtures. Continuous operation on very lean mixtures, surprisingly enough, does not dry out the engine, and the only combustion trouble experienced has been due to deposition of lead oxide. It is worthy of note that the engine will run at the allocated tick-over on four cylinders from cold, and has acceleration characteristics normally associated only with a supercharged engine.

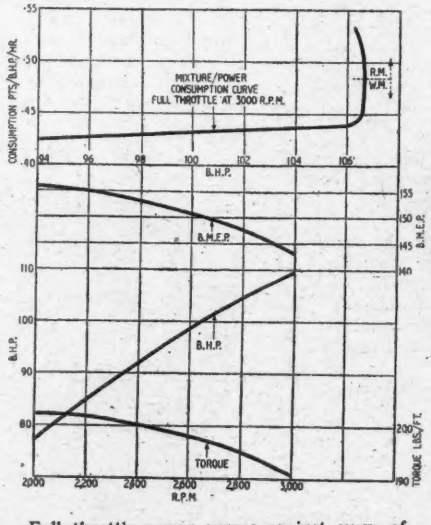
Full-throttle runs have been made down to 2,000 r.p.m., and on 80 octane down to 2,500 r.p.m., without the slightest sign of detonation. It was not thought fair to the reduction gear to go any farther, as, at the former figure, a b.m.e.p. of 156 lb/sq in had been obtained.

The Air Ministry official agreed with the following results at between 96 and 100 hours:—

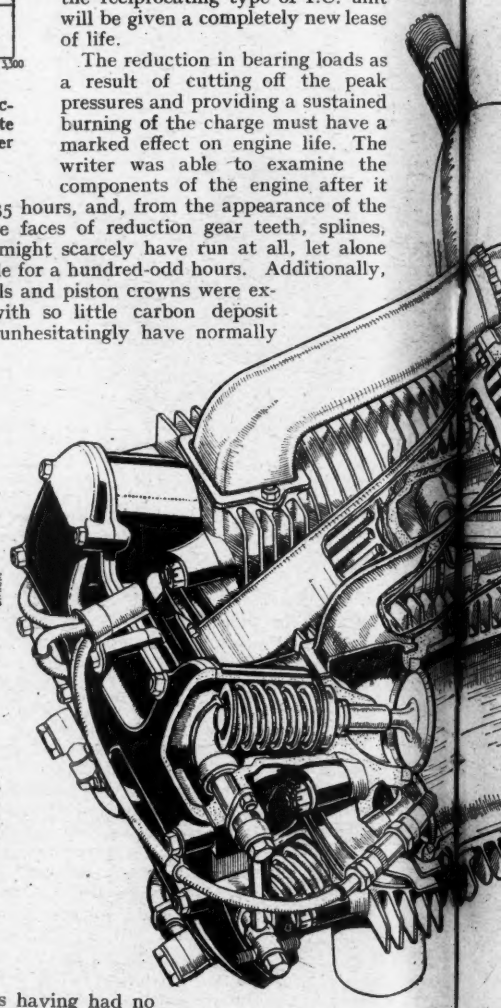
Fuel: 87 octane.
B.H.P.: Full throttle, 104-8 at 3,000 r.p.m.
B.M.E.P.: 138.3 lb/sq in.
Max. economical cruising: 90 b.h.p.
B.M.E.P.: 120 lb/sq in.
Consumption: 0.42-0.43 - pt/b.h.p./hr=0.385 lb/b.h.p./hr.

In comparison with conventional piston-engine performance the results obtained from this engine are well-nigh unbelievable. If the practical application of the Jameson induction system can be extended to piston engines generally, it is by no means an exaggeration to say that the reciprocating type of I.C. unit will be given a completely new lease of life.

The reduction in bearing loads as a result of cutting off the peak pressures and providing a sustained burning of the charge must have a marked effect on engine life. The writer was able to examine the components of the engine after it had run about 235 hours, and, from the appearance of the bearings, pressure faces of reduction gear teeth, splines, etc., the engine might scarcely have run at all, let alone run at full throttle for a hundred-odd hours. Additionally, the cylinder heads and piston crowns were extremely clean, with so little carbon deposit that one would unhesitatingly have normally dismissed them as having had no more than 20 hours at half throttle.




**Full throttle power curves against curve of specific consumption at optimum weak mixture.**



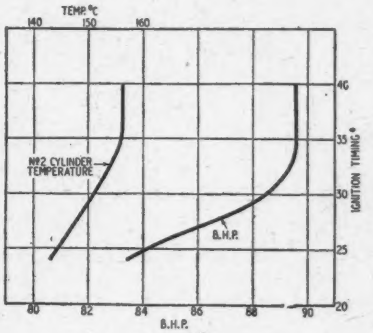
Magnesium has been used extensively in the new engine, and, although the power weight ratio is low for an engine of its power category, the design is so robust that if necessary the weight could undoubtedly be reduced well below the present figure.

## SON AERO ENGINE

As may be seen from the detail sketch, the reduction gear is a single-stage spur type in which the driving wheel on the crankshaft engages an internally toothed bell annulus on the airscrew shaft; thus the latter is offset above the axis of the crankshaft.

Valve gear design on this engine is particularly neat. Each pair of cylinders is served by an extremely short camshaft set above and to one side of the crankshaft, each camshaft being carried in two roller bearings, one at each end of the gang of cams. Channels on the shafts form the roller ways (in effect, the inner race) and the outer "race" of the rollers is a steel sleeve which has an interference fit in the crankcase, being located and locked by a dowel bolt; a large cut-out in the sleeve allows for rocker motion.

The rockers for the cams are contained in small box-housings on the crankcase, and the relative lever arms about the axes of cam rockers and valve rockers are identical, thus the valve gear motion can be said to be geometrically balanced as the cam lift and valve are equal.



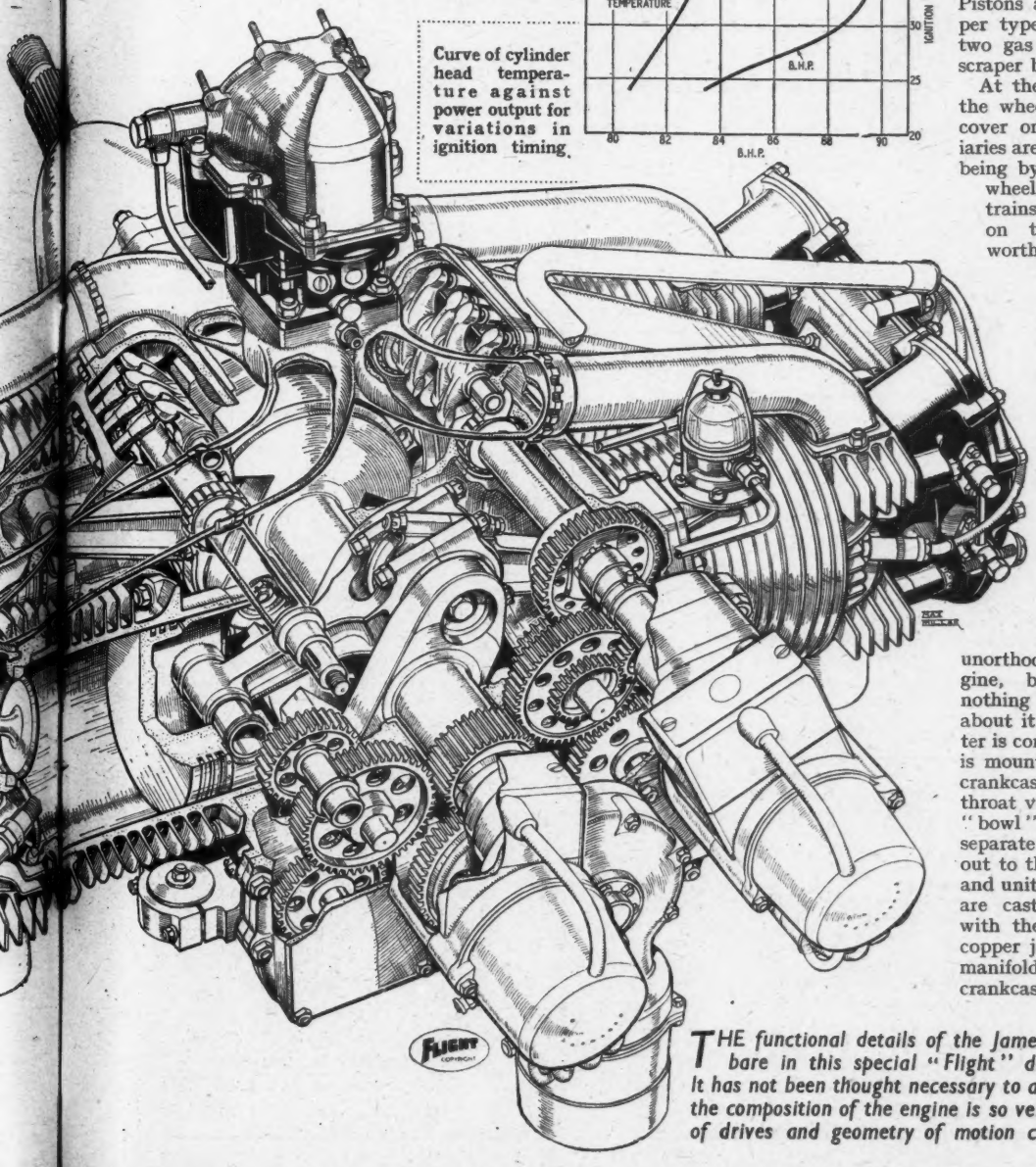

Curve of cylinder head temperature against power output for variations in ignition timing.

### Cylinder Assembly

Cylinder heads are cast light alloy, screwed and shrunk on to the cylinders, the combustion chambers being hemispherical, with two sparking plugs quadrantly disposed to the two valves. The head is adequately finned, and the valve gear layout is such that the cooling flow through and over the heads is extremely good, but the fact that the normal running temperatures of this engine are so low makes this aspect of the design not at all critical. Cylinders are machined from forged billets of S.79 steel each carrying nine fins of about $\frac{1}{8}$in pitch. The cylinder skirts have a bearing depth of about one inch in the crankcase and are retained by four bolts and four studs each. Pistons are a flat-crowned slipper type by Specialloid, with two gas rings and a grooved scraper beneath.

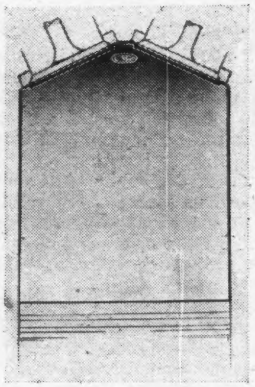
At the rear of the crankcase the wheelcase is enclosed by a cover on which all the auxiliaries are mounted, the drives all being by means of simple spur wheels forming compound trains with the input wheel on the crankshaft. It is worthy of note that there is not a single bevel wheel in the whole engine. The auxiliaries comprise two fuel pumps, two magnetos, vacuum pump, tachometer drive, generator, starter and built-in gear-type oil pumps. The latter is a two-bank unit with scavenge at the front and main pressure at the rear, the pump casing being housed entirely within the wheel case.

The induction system is the only really unorthodox feature of the engine, but even so there is nothing complex or involved about it. The Zenith carburetter is conventional in design and is mounted centrally above the crankcase, with the discharge throat vertically above a central "bowl" from which the four separate manifold pipes branch out to the cylinders. The bowl and unit portion of the branches are cast in magnesium alloy, with the final branch pipes of copper joined to them, the cast manifold being attached to the crankcase by through-bolts pick-

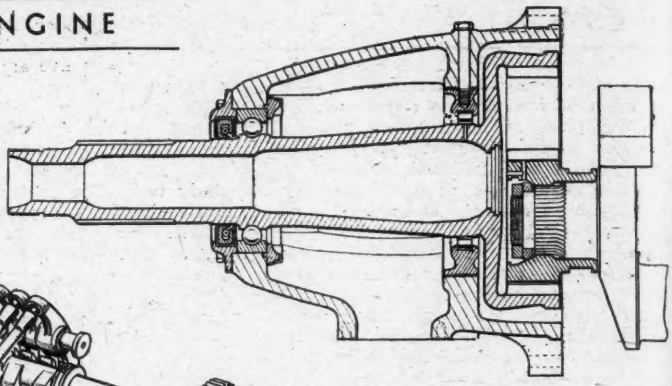



*THE functional details of the Jameson F-F engine are laid bare in this special "Flight" drawing by Max Millar. It has not been thought necessary to annotate the drawing as the composition of the engine is so very simple, and the train of drives and geometry of motion can readily be followed.*

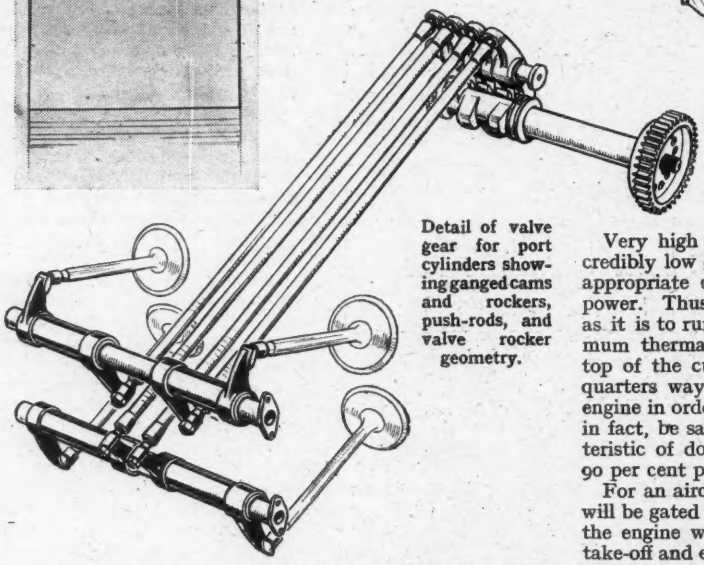
# JAMESON AERO ENGINE



Diagrammatic illustration of progressive variation in mixture strength from rich lodgement under plugs to very weak at piston. Piston at start of compression stroke.



Section through reduction gear showing offset between crank- and prop-shaft axes, and details of unusual bearing design.



Detail of valve gear for port cylinders showing ganged cams and rockers, push-rods, and valve rocker geometry.

ing up four lugs cast integrally with the manifold.

The sequential firing order is employed so that the successive depressions in the manifold branches will generate a vortex in the bowl beneath the carburetter, thus producing stratification in the charge-flow at each induction stroke, in order that the juxtaposition of the mixture strata shall give the requisite progression in mixture strength between cylinder crown and sparking plug.

## High Economic Power

The very low running temperatures are entirely due to the fact that the rich-mixture strata are not affected by the intake of excess air—that is, the quantity of air aspirated over and above that normally required for a combustible mixture—and, as a consequence, this excess air carries off the radiant heat so that the running temperature of the engine is brought down well below that usual in orthodox power units.

Very high volumetric efficiency gives the engine its incredibly low consumption which, as may be seen from the appropriate curve, applies up to about 90 per cent full power. Thus it is relatively as economic to run at 90 h.p. as it is to run at a "cruising" 75 h.p. Further, the optimum thermal efficiency of this engine being toward the top of the curve instead of, as normally, about three-quarters way up, it is not necessary to have a 130 h.p. engine in order to cruise at 90 h.p. The Jameson unit can, in fact, be said to be akin to the gas turbine in its characteristic of doing its work best and most economically at 90 per cent power.

For an aircraft installation, the throttle lever movement will be gated so that at the normal maximum open position the engine will be producing 90 per cent power; but for take-off and emergency use the throttle lever will be pushed through a gate and by so doing richen the mixture to provide full power. Going through the gate will not open the throttle as such, the choke tube being fully open at the 90 per cent power position.

To sum up, it may well be appreciated that, whilst the horizontally opposed layout is one of the oldest in piston-engine history, the outstanding nature of this engine's performance and, particularly, the numerous advantages which are derived, put it in something of a class by itself. Prophecy is always an unreliable business and, of course, this engine is still young; but it has been established at officially witnessed running trials that the performance is not a "flash in the pan," and there would seem to be little doubt that the Jameson induction system is likely to find wide acceptance in future piston engines of all kinds, for it seems not only to better performance but, at the same time, to get rid of many of the design troubles attendant with conventional high-performance engines.

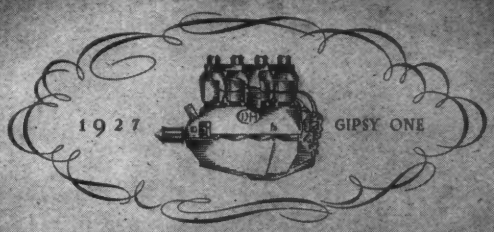
### JAMESON F.F. ENGINE DATA

**Type: Horizontally opposed flat-four air-cooled.**

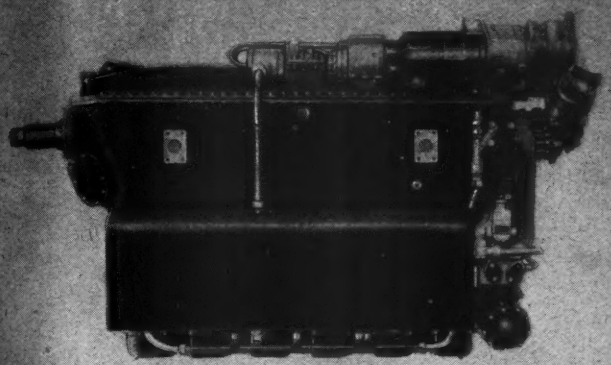
| | | | |
|---|---|---|---|
| Bore and stroke | 4.125in. x 3.75in (104.6 mm. x 95.5 mm). | Cylinder compression ratio | 7.4 : 1. |
| Total swept volume | 200.44 cu in (3.28 litres). | Max b.h.p. | 110. |
| O.A. Length | 33in. to rear cone. | Max r.p.m. | 3,300. |
| O.A. Height | 23¾in. over carburetter. | Cruise r.p.m. | 3,000. |
| O.A. Width | 34in. | Max. b.m.e.p. | 156 lb/sq in. |
| Frontal area | 2.115 sq ft bare engine (296 sq in). | Max. torque | 202 lb/ft. at 2,000 r.p.m. |
| Reduction gear | Single stage internal tooth. Ratio : 0.619 : 1. | Power/litre | 33.5 b.h.p. |
| Rotation | C/shaft : L.H. A/S shaft : L.H. | Power/weight ratio | 2.542 lb./b.h.p. |
| Airscrew shaft size | S.B.A.C. No. 1. | Dry weight | 280 lb inc. all accessories except generator. |
| Valve type | Poppet. | Weight/sq in piston area | 5.24 lb. |
| No. of valves/cyl | Two | Max. mean piston speed | 1,920ft/min. |
| Plug positions | 2/cyl: quadrantly disposed to valves. | Take-off consumption rate (110 h.p.) | 6.46 g/hr. = 0.47 pts/hp/hr. = 0.426 lb/hp/hr. |
| Firing order | S, rear; S, front; P, front; P, rear. | Normal cruise consumption (90 h.p.) | 4.78 g/hr. = 0.425 pts/hp/hr. = 0.384 lb/hp/hr. |
| Crankshaft type | Two-throw fully counterbalanced. | Fuel specification | 87 octane. |
| Bore to stroke ratio | 1.1 : 1. | Oil specification | DTD 2472 B. |
| Distance centre to centre of cyls. | 6.625in. | | |
| Con. rod length, centre to centre | 6.125in. | | |
| Max. angularity of con. rod | 17 deg. 2 min. | | |
| Piston area/cyl | 13.364 sq in. | | |

**Auxiliary drive speeds (ratios relative to crankshaft)**

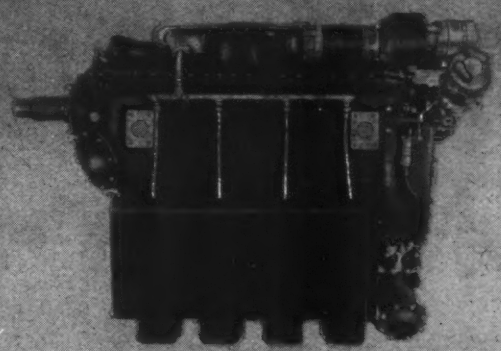
| | | | |
|---|---|---|---|
| Tachometer | ½ engine speed. | Fuel pump | ½ speed. |
| Generator | 0.666 : 1. | Oil pumps | 0.6 : 1. |
| Vacuum pump | 0.4 : 1. | Starter | Direct. |
| Magneto | ½ speed. | Type of Starter | Rotax 12.v. |



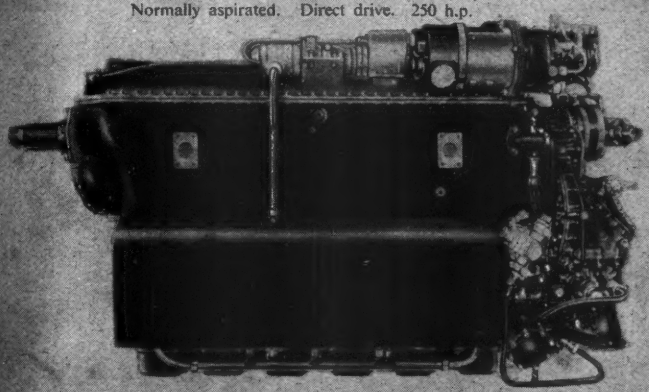

Out of two decades of consistent development work on one basic design, coupled with operating experience quite unequalled in their category, the de Havilland Engine Company have evolved, ready for the new era, the most advanced series of light aero engines in the world



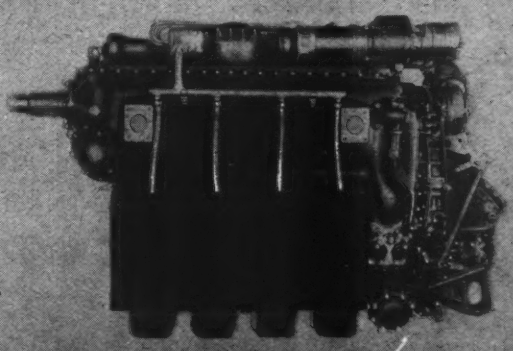
GIPSY QUEEN 30
Normally aspirated. Direct drive. 250 h.p.



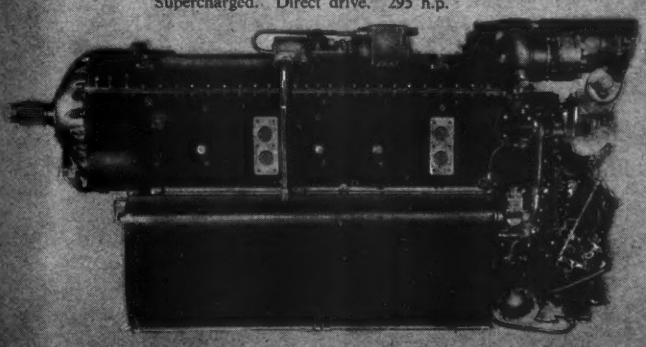
GIPSY MAJOR 30
Normally aspirated. Direct drive. 160 h.p.



GIPSY QUEEN 50
Supercharged. Direct drive. 295 h.p.



GIPSY MAJOR 70
Supercharged. Direct Drive. 197 h.p.



GIPSY QUEEN 70
Supercharged. Geared. 330 h.p.

*The new*

# GIPSY ENGINES

for world markets

DH ENGINES

THE DE HAVILLAND ENGINE COMPANY LIMITED

THE HANDLEY PAGE HERMES

*Complete*

furnishing, decoration, thermal insulation, soundproofing and passenger services

*by*

# RUMBOLD

THE SPECIALISTS IN COMFORT ENGINEERING

L·A·RUMBOLD & CO. LTD KILBURN N.W.6

# HERE AND THERE

**AS NAVIGATORS?** The Girl Guide movement has now inaugurated an Air Ranger section. Apart from giving the girls instruction in ground handling and aircraft maintenance, it is intended that they should be able to obtain air experience on gliders. They are shown here being initiated into the mysteries of using dope for fabric repairs. In the background is a Ju 52 used for demonstration.

## Meteor in South Africa

BY flying from Langebaan airfield to Cape Town, a distance of 65 miles, in seven and one half minutes, Capt. Jack Meaker, on Wednesday, 15th May, attained the fastest speed—520 m.p.h.—ever recorded in South Africa. His aircraft was a Gloster Meteor.

## Sandwich Construction

MANY people who have a nodding acquaintance with methods of aircraft construction know the meaning of the description "balsa-plywood sandwich construction." Not so many, however, know how this highly specialised process is carried out.

In the case of the de Havilland Hornet the halves of the fuselage shell are formed from a sandwich of balsa wood between two skins of plywood, and the gluing process takes place on a concrete mould—or, more accurately, core—on which the half-shell is built. It is then subjected to the pressure of some fifty flexible steel bands which are tightened-down upon it. The bands are heated by an electric current in order to obtain the optimum glue-setting time.

The process is described in detail in a second instalment of the article on de Havilland Hornet production, appearing in the June issue of *Aircraft Production*, on sale next Monday, May 27th.

## A Point from Sweden

IN a paragraph in *Flight* of March 21st we alluded to the "national Swedish aircraft factory" as Svenska Aeroplan A.B. This concern was, in fact, founded in 1937 by a number of Swedish industrialists, and the government has never been concerned with it.

## Architects Over London

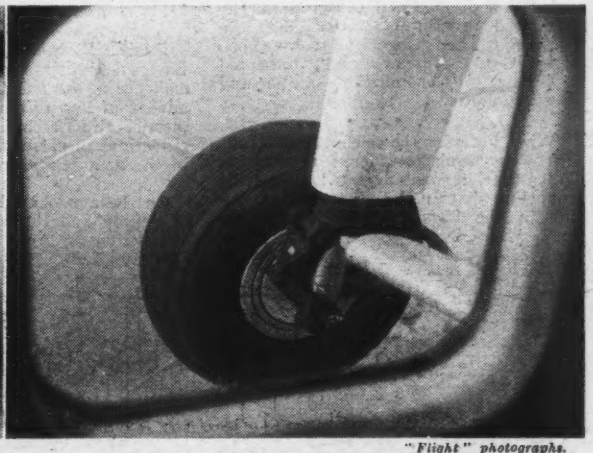
THE British Council is arranging flights over London for architects and town-planners from overseas. This is considered to be the best way of giving them a general grasp of the layout of the metropolitan area, the siting of housing estates and other features.

## Victory Pageant

IT will be quite like old times at Southampton airport on June 22nd, when the local branch of the Air League is organizing a "Victory Air Pageant." There will be a flying display of Service and civil types. The pageant will be opened, it is hoped, by Lord Winster. In connection with it, a static air exhibition is also being organized in Southampton to be open between June 15th and 22nd.

## The Goat Will be There

LED by Lewis their Goat, two R.A.F. Halton apprentices' bands will take part in the Victory Day march. Lewis, whose name is derived from the initial letters of London, England, Wales, Ireland and Scotland, is the Halton mascot and, at the age of 2 years 4 months, is the youngest flight-sergeant in the R.A.F. He was only recently promoted for exceptionally good conduct. With his horns and hooves gilded, his white



*"Flight" photographs.*

**IN THE WAYFARER:** (Left) The chief radio officer of Channel Islands Airways, Mr. P. Moss, in the radio compartment of the Bristol Wayfarer. (Right) The non-retractable undercarriage of the Wayfarer is interesting to watch from the front passenger's window. It revolves continually in the slipstream, and when the aircraft flies directly into the sun the flitting shadows from the airscrew blades strobe the moving tyre treads.

## HERE AND THERE

hair shampooed, Lewis should be a handsome and dignified figure in his tailor-made jacket.

### Export Figures

IN reply to a question in the House, the President of the Board of Trade stated that, between August, 1945, and March, 1946, inclusive, 28 aircraft were exported to the Dominions and 67 to foreign countries. The total value was £490,000 and the types included Sandringhams, Proctors, Dominies and Avro 19s. In addition, about 1,400 surplus military aircraft were sold abroad.

### Models Again

AN important section of the 21st annual exhibition to be organized in August by *The Model Engineer* will be that devoted to model aircraft. This section is being sponsored by the Society of Model Aeronautical Engineers, whose club members all over the country are already busy building entries for the various competitive classes, in which substantial prizes are to be won.

Not that the prize itself is the only incentive, nor even the main incentive in most cases, for the model aircraft builder is among the most enthusiastic of that breed of enthusiasts, the model engineer.

Those who particularly like to see models in action will be able to watch "captive" aircraft in flight, while other sections of the exhibition will show a wide range of engineering and ship models, and tools and technical equipment in wide variety. This exhibition opens on August 22nd in the New Hall of the Royal Horticultural Society at Westminster and runs until the 31st.

### Real "Sky Pilots"

TWO Fox Moths have recently been bought by the Methodist Church in Australia to be used for their inland mission work which will include duty as flying ambulances, and it is hoped to acquire a third machine before long.

The aircraft were obtained from the Disposals Commission and both will be piloted by ministers of the church—the Rev. Clifford Lanham who served with the R.A.A.F., and Mr. D. McCashell who is to be ordained before taking up his duties.

## News in Brief

The Minister of Civil Aviation has appointed Mr. J. J. Taylor, home manager of the Workers' Travel Association, Ltd., to act as an "independent person" on the Air Registration Board. This honorary appointment is for two years.

* * *

All personnel in the R.N.Z.A.F. who wish to be demobilized, says a Reuter report from Wellington, will be released by June 30th, and 2,000 men are taking advantage of this provision to leave the Service where there has been some dissatisfaction on the grounds that men have been held to perform "unessential civilian work."

* * *

The first Russian aircraft to land in Holland since the war took home to Schiphol airport recently members of a delegation of Dutch flower-growers who organized a Dutch flower show in Moscow. The delegation took 30,000 flowers to Moscow and presented bouquets to Generalissimo Stalin and Mme. Molotov.

* * *

When ideas for the celebration of June 8th were being considered recently in Folkestone, it was suggested by a local councillor that an R.A.F. formation, flying in the form of the Cross of St. George, should drop roses over the Channel and along the beaches to Dunkirk in memory of the fallen. The Air Ministry, however, is unable to provide the necessary aircraft.

* * *

The need to pre-heat aircraft engines before starting in sub-zero temperatures is said to be eliminated by a new cold starting fuel recently made commercially available in the U.S. The special fuel, which is fed to the priming and carburation system for the first two minutes, was originally produced for military operations in the Far North.

* * *

Bell Aircraft Corporation has recently granted the first helicopter licence to be issued in the U.S., and is beginning production of 500 Model 47 helicopters for commercial operation, first deliveries being due this summer.

* * *

Eddie Rickenbacker, president of Eastern Airlines, recently told a radio audience at Kansas City that, with the advent of gas turbine engines on commercial aircraft, he foresaw substantial reductions in passenger and freight rates in the next few years.

* * *

On the amalgamation of the Ministry of Supply and the Ministry of Aircraft Production on April 1st, 1946, Sir W. Lindsay Scott, K.B.E., D.S.C., relinquished his appointments as Second Secretary in each of these Ministries, and has retired from the public service.

* * *

Aerofilms, Ltd., has reopened its library of air photographs at 29, Old Bond Street, London, W.1, and once more has its own aircraft back in commission. New material will be added every month, and it is hoped to build up an overseas series of air photographs.

* * *

A selection of objects from the Penn-Gaskell aeronautics collection—china, glass, miniatures, medals, snuff-boxes, etc., bearing representations of balloons and famous ascents—has been lent to the Science Museum, South Kensington, by Miss Winifred Penn-Gaskell, and is now on view. The exhibits show the influence of the balloon, in France and England, from 1783 onwards.

* * *

By arrangement with a Persian Government department, Soviet aircraft are spraying poisonous liquid over locust-infested Persian territory, it was recently stated by Moscow radio.


### GAS TURBINES AND JET PROPULSION FOR AIRCRAFT

**By G. Geoffrey Smith, M.B.E.**

*A FOURTH Edition of this pioneer work, first published in 1942, has now gone to press. Copies will be available in the course of a few weeks.*

*Greatly enlarged, the new edition carries the development of aircraft gas turbines up to the present day and also envisages future possibilities in regard to both propulsion units and aircraft.*

*General principles of jet propulsion, thrust and performance, rotary components, combustion systems, fuel equipment and control, metallurgical problems and testing and maintenance are dealt with in the early chapters.*

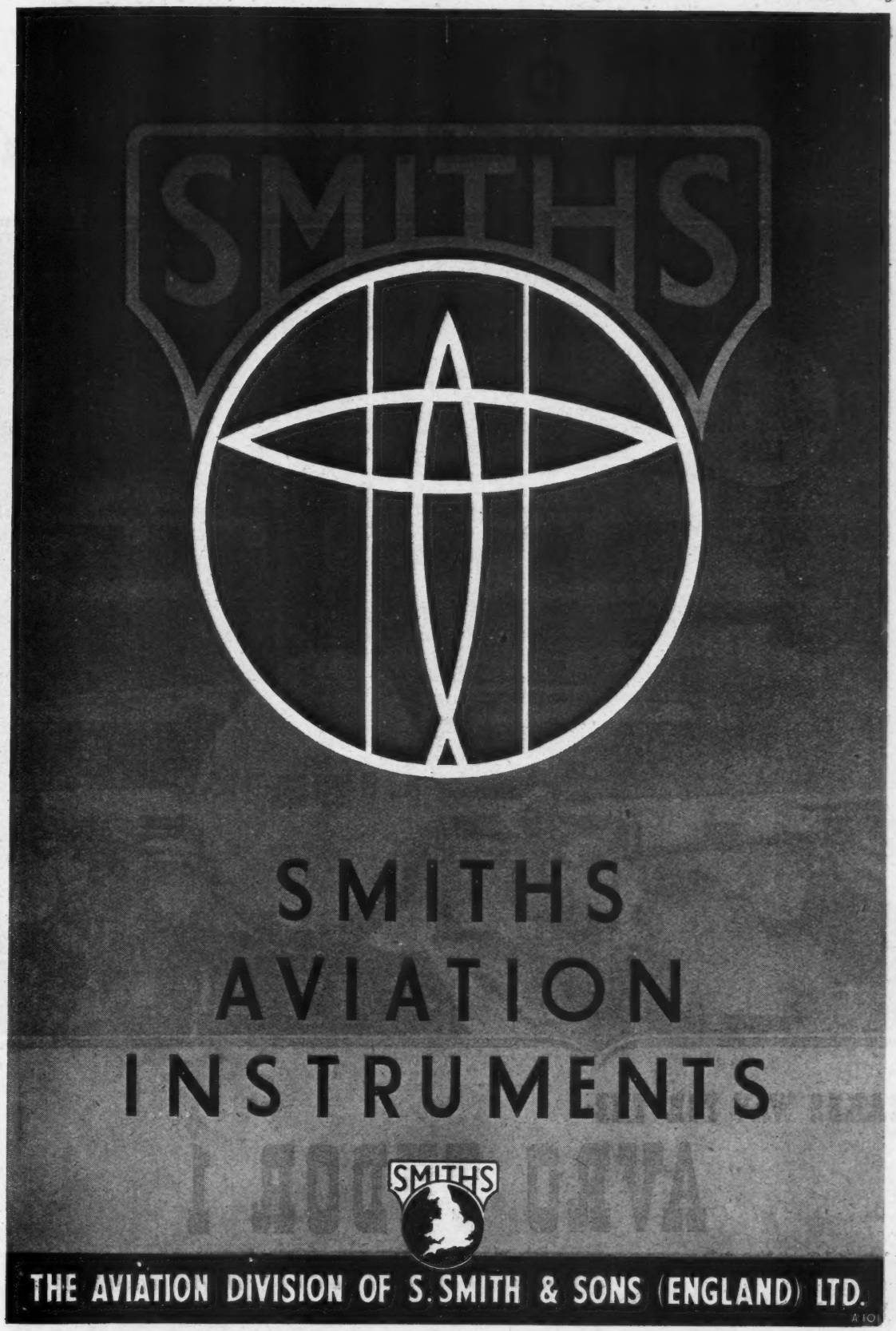
*Descriptions are included of all existing turbine units, both pure jet and airscrew types, in this country and abroad.*

*The relative merits of jet and airscrew propulsion, the problem of high speed flight, the influence of turbine power units on aircraft design and the probable development of flying wings and tailless types form an important section.*

*The previous editions, two of which were also published in the U.S.A., have for some months been completely exhausted. They have been adopted as the standard text by numerous universities, technical institutions, libraries and both governmental and commercial training centres.*

*Further announcements relating to the new edition will be made later.*


AIRSTRIP . . . . No. 15


SMITHS
SMITHS
AVIATION
INSTRUMENTS
SMITHS
THE AVIATION DIVISION OF S. SMITH & SONS (ENGLAND) LTD.
A 101

THE FAMOUS

AVRO LANCASTER HEAVY BOMBER

MAKES WAY FOR THE

# AVRO TUDOR 1

BRITAINS FIRST POST-WAR AIRLINER

A. V. ROE & CO. LIMITED MANCHESTER (Branch of Hawker Siddeley Aircraft Co. Ltd.)

# Water Injection for Aircraft Engines

PAPER BY
M. R. ROWE
G. T. LADD

## *Results of Experiments by the Wright Aeronautical Corporation : Water and Water-Alcohol Additions*

WATER injection was the subject of experiment in the automobile industry as long as twenty years' ago, while in contrast the virtually negative results of experiments with cars, carried out only last year, were recently revealed. For aircraft engines the requirements and operating conditions are different, and a great deal of experimental and development work has been carried out, particularly in the United States, with a view to taking the best advantage of the cooling and anti-detonation effects which can result from water or water-alcohol injection for petrol engines.

Following is a summary of the principle, reasoning and conclusion contained in a paper on Water Injection for Aircraft Engines read before the Society of Automotive Engineers by Mr. M. R. Rowe and G. T. Ladd of the Wright Aeronautical Corporation. This paper deals with water-alcohol mixtures as well as plain water, and the term "antidetonant injection" is used synonymously with that of water or water-alcohol injection.

The authors state that:—

"Basically, calculations have shown that the cylinder-head cooling obtained by using water or water-alcohol injection represents approximately 30 to 40 per cent of the available heat of vaporization of the injected water. However, this heat of vaporization is not considered to be the total resultant effect of water injection. Test-result calculations on the compression of gaseous fluids have demonstrated that the work exponential of the basic equation $PV^n = K$ will be reduced as water is injected into the work cycle, and that this reduction may amount to 10-12 per cent. This change indicates that the specific heat during the combustion cycle would have to be taken into account in any truly theoretical analysis of water injection.

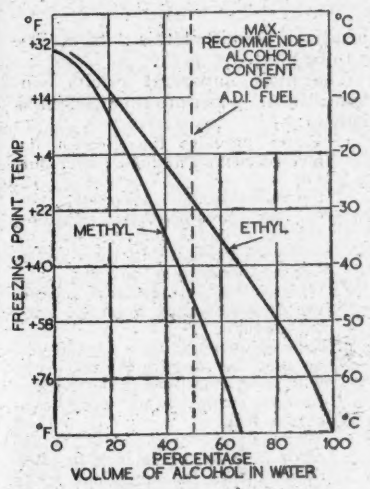



**Fig. 1. Freezing points of methyl and ethyl alcohol solutions.**

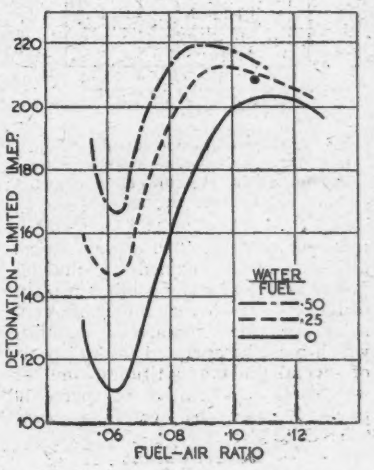



**Fig. 2. Typical effect of water injection on detonation-limited i.m.e.p. for CFR engine.**

### Peak Pressure Cooling

"In addition, calculations made at absolute intake charge pressure conditions for constant speed, and increasing horsepower at constant cylinder-head temperatures, show that the slope of specific brake water consumption does not change when going from a pressure condition of complete vaporization to that where the pressure is too high to permit vaporization. This is important and indicates that the main cylinder-head cooling effect is obtained during the high temperature and pressure peaks of the combustion cycle, since it does not appear to matter whether the water enters the cycle as either vapour or liquid.

Experience at the Wright Aeronautical Corp. has taught that water and water-methanol mixtures are best suited for detonation inhibitors and internal coolants. The addition of 50 per cent by volume of methanol to water is considered to be the optimum for water-methanol mixtures. Tests with pure alcohol, either methyl or ethyl, have indicated decreases in detonation-limited power outputs as compared to 100-octane fuel. Investigation of water vapour injection into induction air ahead of supercharging has shown that this medium is an effective detonation inhibitor at lean fuel-air ratios only.

"Selection of the anti-detonant fluid for addition to basic fuel flow is dependent upon three main factors: (1) The power output desired in excess of normal detonation-limited output; (2) the importance to the operators of engine critical altitude performance; (3) the ambient or atmospheric temperatures in which the aircraft is to operate.

"Water alone offers the best rate of engine cooling, water-methanol mixtures permit the greatest power output, and water-ethanol mixtures are inferior under both headings to either plain water or water-methanol. The freezing points of methyl and ethyl alcohol solutions are shown in Fig. 1. Fortunately, the better anti-detonant

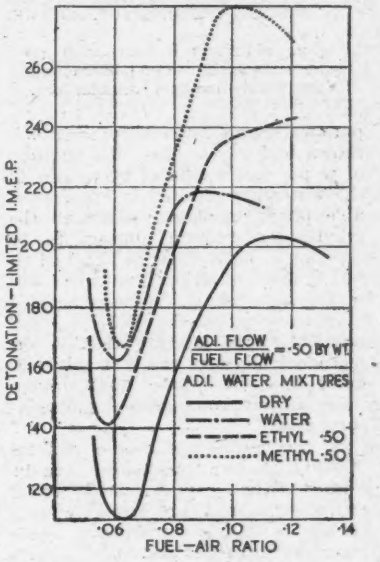



**Fig. 3. Effect of various anti-detonant fluids on detonation-limited i.m.e.p. for CFR engine.**

# WATER INJECTION FOR AIRCRAFT ENGINES

constituent—methyl—has the advantage, requiring approximately 30 per cent less addition for the same freezing point.

"Figs. 2, 3, and 4 illustrate the effects of water, methyl, and ethyl alcohol mixtures on detonation-limited i.m.e.p. These data were obtained using a single-cylinder supercharged CFR engine for the purpose of establishing a working background for Wright Cyclone engines. Fig. 2 indicates that the addition of water to fuel will permit a variable increase in detonation-limited i.m.e.p. dependent upon the fuel-air ratio employed. It also shows that the percentage increase in detonation-limited i.m.e.p. is reduced with an increase in the rate of injection of water and fuel. Full-scale operation has shown that water mixtures in excess of 50 per cent by weight of fuel tend to drown out the engine combustion cycle when operating at rich mixtures. This drowning tendency is best overcome by using water-alcohol mixtures instead of pure water, and by operating at best-power fuel-air ratios.

"The advantage of water-methyl alcohol mixtures as compared with

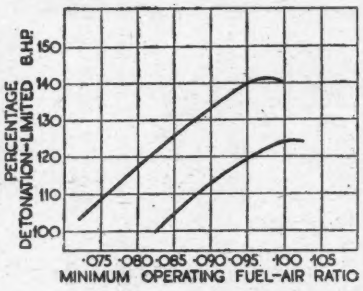



**Fig. 4. Minimum fuel-air ratio requirements for increased power output using water-methanol fuel additions.**

pure water as a detonation inhibitor is shown in Fig. 3. Here, the addition of 50 per cent methanol by volume to the water has resulted in a considerable power increase. Although the ethyl-water mixture appears to be superior to plain water at rich fuel-air ratios, this conclusion is not borne out by full-scale testing. Full-scale engine investigations at the Wright Aeronautical Corp. indicate that water-methanol mixtures are best suited as detonation inhibitors, with plain-water second, and water-ethanol mixtures last."

A conclusion which the authors wished to make at this point was that: "pure water is approximately equal to fuel when used as an engine internal coolant at high power output. This factor is important because it represents a possible fuel cost saving of approximately 25 per cent with a small increase in fluid weight. Also, approxi-

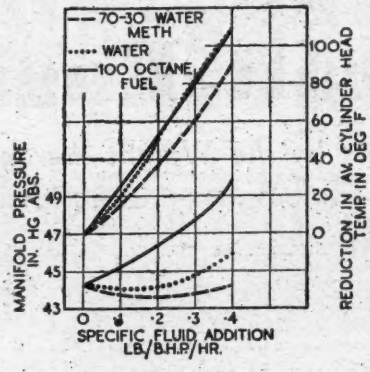



**Fig. 5. Effect of supplementary fluid addition on cylinder head temperature and manifold pressure of a typical Cyclone engine.**

mately 1,000-2,000ft of engine critical altitude can be gained at take-off power by use of water cooling in place of fuel cooling—a very important consideration for commercial aircraft which must be operated from airports of several different altitudes, and for which the possibilities of increased payload must be carefully considered."

## Fuel Coolant

The effects of water, water-methanol, and gasoline injection as an engine internal coolant are shown in Fig. 5. The data were obtained at approximately 90 per cent of engine take-off b.h.p. and a constant-datum fuel-air ratio of 0.080. The reduction in average cylinder-head temperature is approximately the same for fuel and water additions. Water-methanol mixtures are less efficient from the cooling standpoint, i.e. approximately 80 per cent as efficient as water or fuel for the 70-30 per cent water-methanol mixture used.

A disadvantage of the use of fuel as

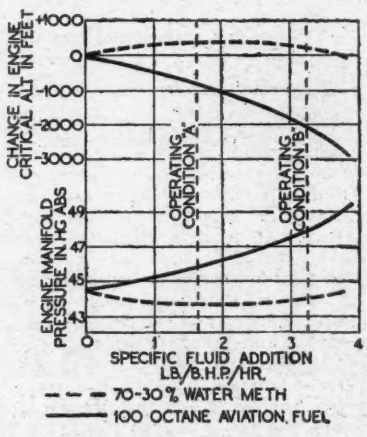



**Fig. 6. Effect of supplementary fluid addition on the critical altitude of a typical Wright Cyclone engine.**

an internal coolant is shown by the 5 to 10 per cent increase in engine manifold pressure requirements, representing a loss in engine critical altitude. This loss, shown in Fig. 6, amounts to 1,000-2,000ft, depending upon the operating condition desired.

Having established the effective cooling possibilities of water injection, Fig. 7 has been prepared to illustrate the possible increase in a.m.p.g. obtained by reduction in cylinder-head temperatures. These data are based on cruising conditions for a large commercial aircraft travelling at an indicated air speed of 225 m.p.h.

The effect of cooling drag change at constant thrust horse-power permits the calculation of decreased b.h.p. requirements for constant-speed flight, and therefore the decrease in gallons of fuel per mile, or conversely, the increase in miles per gallon. The relationship of cooling airflow, baffle pressure drop, and cylinder-head tem-

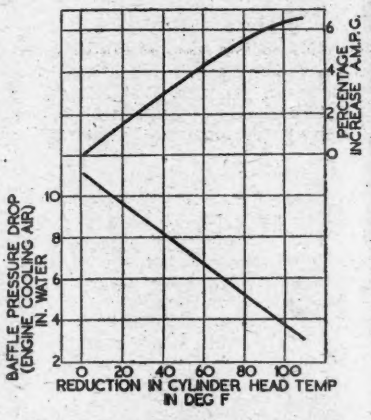
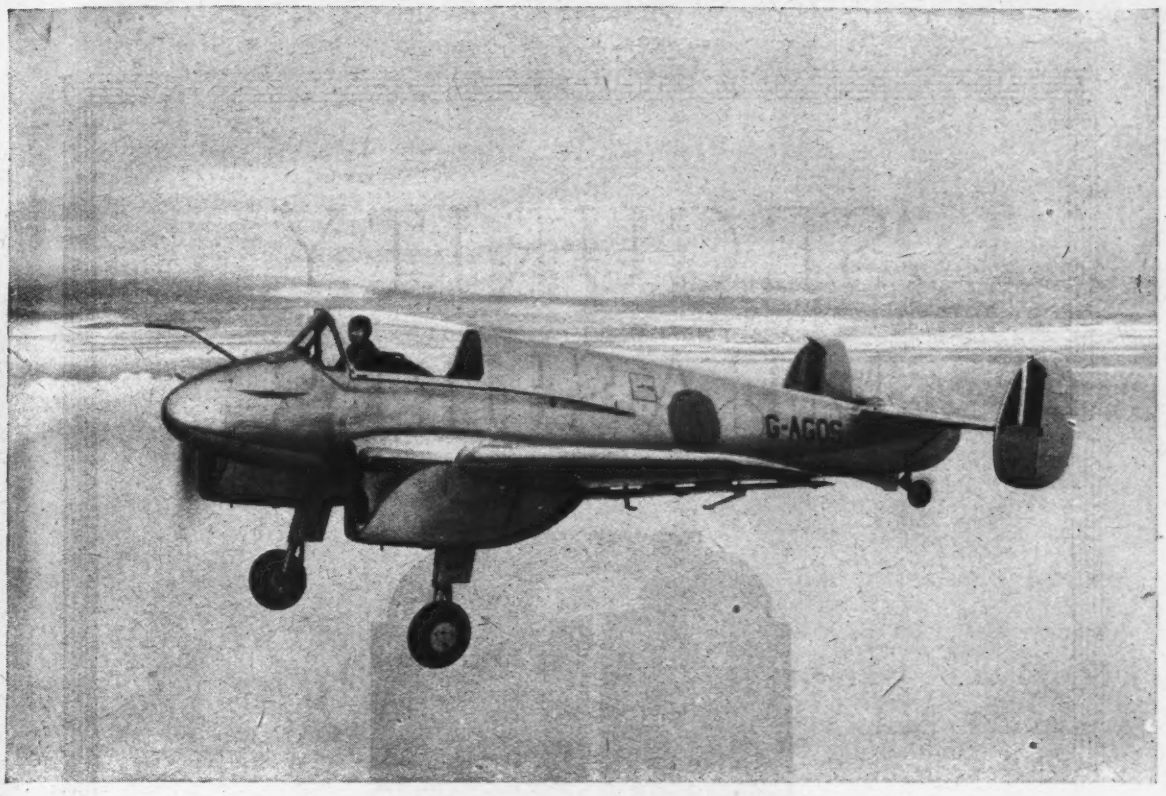



**Fig. 7. The increase in a.m.p.g. made possible by reduction of cylinder head temperatures.**

peratures permitted this data of Fig. 7 to be plotted.

The most important results contained in the paper are summarized as follows:—

1. Water provides the greatest degree of cooling at high power output.
2. Water-methanol mixtures are superior to water-ethanol mixtures.
3. Water methanol mixtures provide greatest increase in detonation-limited horsepower output.
4. Water methanol mixtures provide the greatest saving in engine critical altitude.
5. Pure alcohol additions should not be used for aircraft engines—they will cause a decrease in detonation-limited output when using 100-octane fuel.
6. Water injection will permit the use of 91- and 87-octane fuels in place of 100-octane for equivalent power output up to take-off horsepower.
7. Water injection can be used most efficiently at lean fuel-air mixtures.




# *For complete flying training the*

# DESFORD

## *sets a new world standard in light aeroplanes*

New standards in economy of operation and maintenance are set up by the dual-control Desford trainer now on test for the R.A.F. It is the development of a company which besides its fame as makers of fine flying instruments, has trained many thousands of pilots for the R.A.F. in its own schools — and is always willing to co-operate with you over training problems. The Desford is immensely strong. Further, it can be parked out of doors in all weathers. Two unique features are interconnected flaps and throttle controls, and pneumatic engine revolution indicators. Every point about training — from the first to the last stage — has been thought out and provided for. Owing to the excellent view which both occupants have, it would also be ideal for police patrols or even as a private machine. Full details on request.

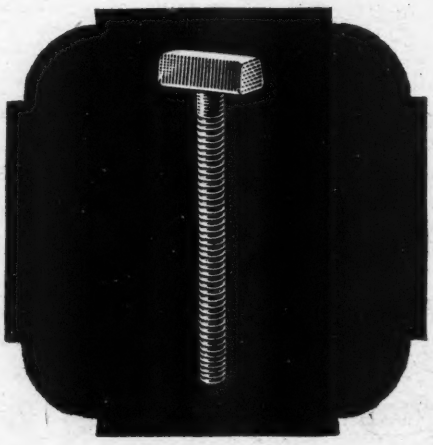
*PERFORMANCE: With two D.H. Gipsy Major Series 1 four-cylinder in-line inverted air-cooled engines of 130 h.p. per engine at sea level.*

| | |
|---|---|
| *Maximum speed, sea level* | 162 *m.p.h.* |
| *Maximum cruising speed, sea level* ... ... ... | 148 *m.p.h.* |
| *Cruising range* ... ... | 463 *miles.* |
| *Rate of climb* ... | 1,100 *ft. per min.* |
| *Absolute ceiling* ... ... | 19,200 *ft.* |
| *Service ceiling* ... ... | 17,730 *ft.* |

*Reid & Sigrist*

REID AND SIGRIST LTD. KIRBY MUXLOE, LEICESTER

# SECURITY MEASURES



TIE BOLT

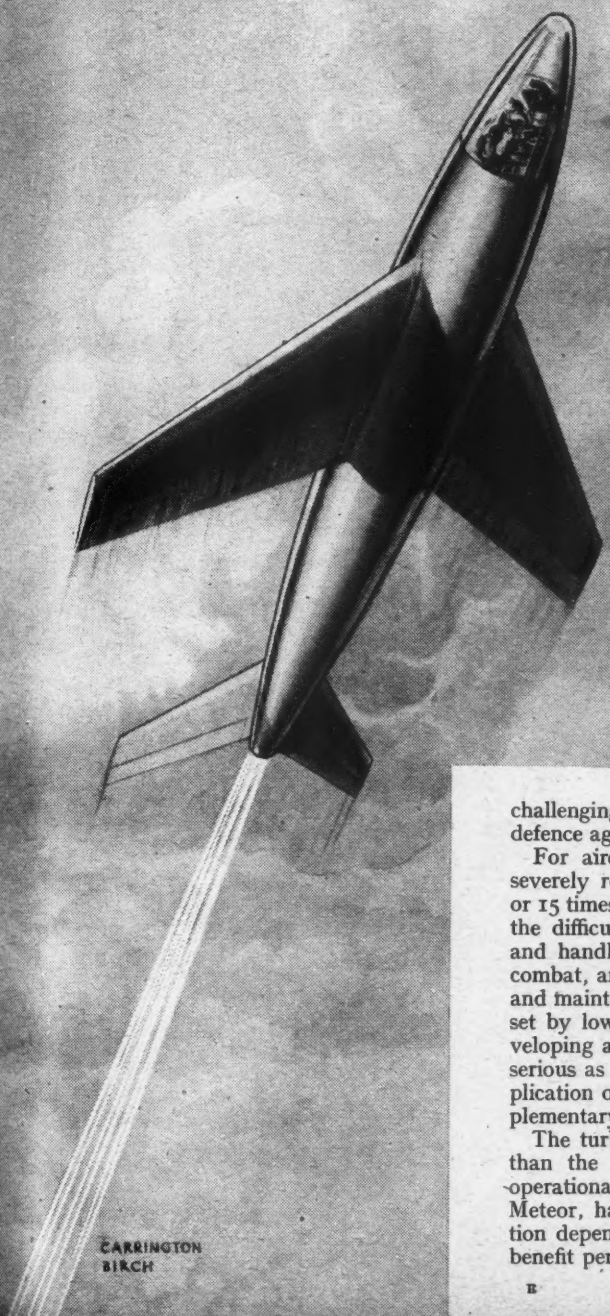
This Bolt was originally turned from Round Bar and Milled, or manufactured as a Hot Brass Stamping. Cold Forging showed an approximate saving of 70% in material.

Specialists in Cold Forging, Roll Threaded Screws, Solid and Tubular Rivets, Nuts and Bolts in all metals, Small Pressings, Auto and Capstan-turned Parts.

LINREAD LTD., STERLING WORKS, COX STREET, BIRMINGHAM 3.
TELEPHONE No. CEN. 3951 P.B.X. TELEGRAMS: "LINREAD BIRMINGHAM."
London Office: Clifton House, Euston Road, London, N.W.1. Tele. No. Euston 8261.

Linread
SPECIALISTS IN COLD FORGING

# ROCKET FIGHTERS



CARRINGTON BIRCH

## *Possibilities and Limitations : Pure-Rocket and Turbine-cum-Rocket Intercepters : Examples from German Practice*

By H. F. KING

THE unique properties of the liquid-fuel rocket (exceptional thrust for short duration at all heights) have established it as the power unit for supersonic pilotless weapons and for the larger and more elaborate forms of ground-to-air, air-to-air and air-to-ground missiles. It is often predicted that robot weapons will eventually displace piloted aircraft in all strategical and in many tactical roles, and there is little doubt that war rockets, inspired by the German A-4 ("V-2"), are the subject of the most earnest research by the Powers, while the ground-to-air rocket missile, already challenging the fighter as a bomber-destroyer, holds promise as a defence against such monsters.

For aircraft propulsion, however, the value of the rocket is severely restricted by its inordinately high fuel consumption—14 or 15 times that of a gas turbine—while attendant disadvantages are the difficulty and danger of manufacturing, transporting, storing and handling the fuels at present required, explosion hazards in combat, and the necessity for providing special airfield installations and maintenance facilities. To some extent these handicaps are offset by low initial cost, easy production and the possibility of developing a fuel common to the gas turbine and liquid rocket and, serious as they may prove, they should not prevent the useful application of the rocket, if not as a main power unit, then as a supplementary plant to gas turbines.

The turbine-cum-rocket intercepter offers a higher rate of climb than the straight-turbine machine, with adequate endurance at operational height, but, as Mr. W. G. Carter, designer of the Meteor, has pointed out, the extent of development in this direction depends largely upon the ability of improved gas turbines to benefit performance without rocket assistance.

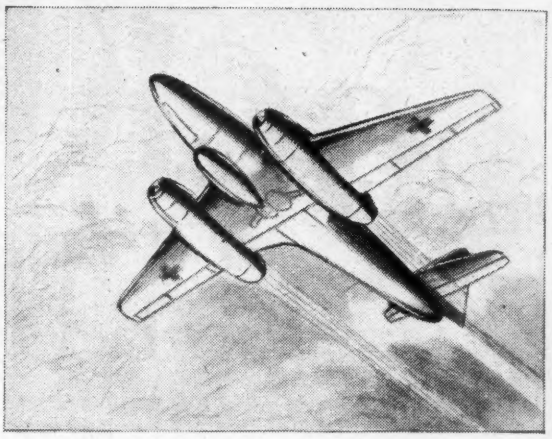
# ROCKET FIGHTERS

Before surveying present applications and future possibilities of the propulsive rocket for fighters, some description of this form of power plant is desirable, and it becomes necessary to refer to German practice. In the development of aircraft rockets the Germans were easily first. An experimental Heinkel (He 176) is reported to have flown about nine years ago under the power of an early Walter unit, but this was not a military type; the first operational rocket fighter was the Me 163B.

German aircraft rockets were developed principally by Walter of Kiel and the B.M.W. concern, though other companies had investigated the problems. The best-known and most successful unit was the Walter H.W.K. 509, as used in the Me 163B. This unit, several specimens of which are now in Great Britain and the U.S.A., weighs only 365 lb, but develops a maximum thrust of 3,300 lb at sea level and 10 per cent greater at 40,000ft. The minimum thrust obtainable by throttling is 220 lb, and the specific impulse 180-190 lb, i.e., about 185 lb thrust is obtained for a consumption of 1 lb of fuel per second.

### Consumption and Construction

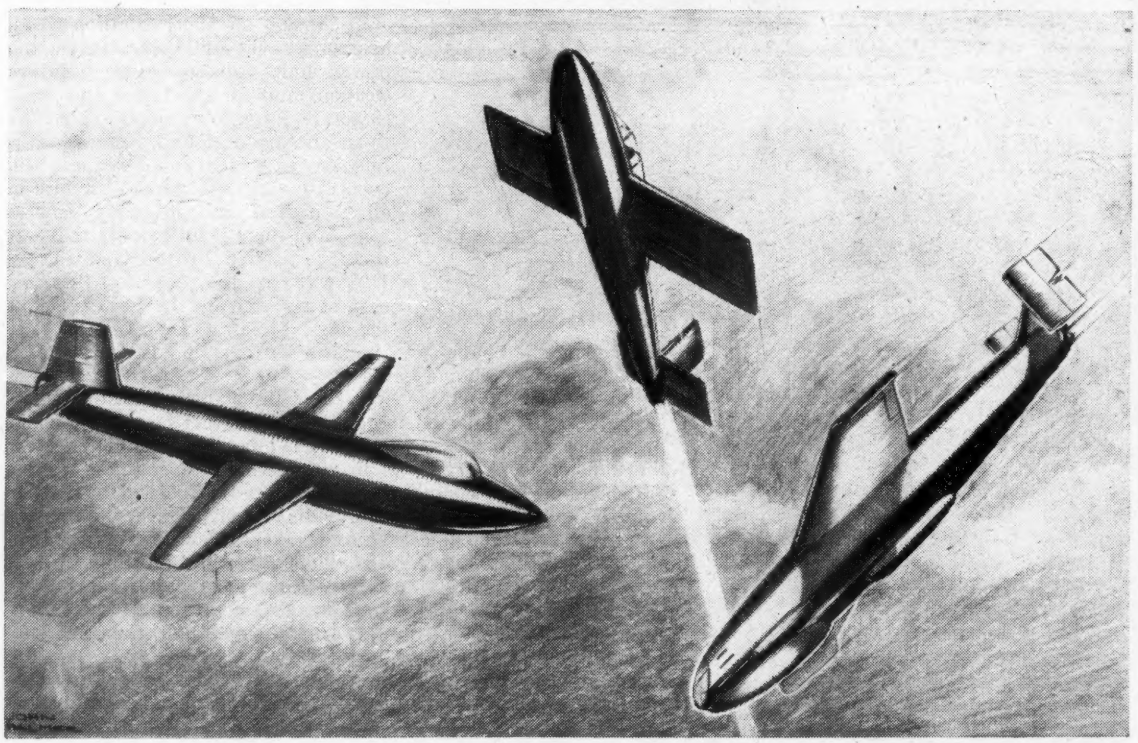
For comparison with turbine-jets it is convenient to express consumption in lb per hour per lb thrust; on this basis the figure for the H.W.K. 509 is 19-20 lb, whereas contemporary German gas turbines, certainly not distinguished for their economy, gave 1.3-1.5 lb. At full thrust the 509 unit consumes about 1,000 lb of fuel a minute, which readily explains the 163B's full-power endurance of about four minutes. It consists of two main assemblies, the forward comprising a housing for the turbine (which drives two worm-type fuel pumps), a control unit, a pressure-reducing valve and an electric starter motor. By the action of a solid catalyst on the hydrogen-peroxide fuel, a small cylindrical unit produces steam to drive the turbine. The second assembly consists of the combustion chamber unit.



The Me 262 with supplementary rocket in the fuselage tail and jettisonable rocket fuel tank

The two fuels are T-Stoff, an 80 per cent concentration of hydrogen-peroxide, and C-Stoff, a mixture of 57 per cent hydrazine hydrate and 30 per cent methanol. C-Stoff is used not only as a fuel, but as a coolant for the double-walled combustion chamber.

A characteristic of the liquid-fuel rocket is its loss of efficiency at low outputs, and this led to the development of the H.W.K. 509C with an auxiliary "cruising" chamber, giving 660 lb thrust, in addition to the main chamber producing 3,740 lb. For climb both chambers are used at their full thrust, but for cruising, the



Three target-defence intercepters which were never completed: (left) the Junkers "Walli" (EF 128), (centre) the Me P.1104, and (right) the Heinkel "Julia"

use of the small chamber alone enables a given thrust to be obtained for a lower fuel consumption than would be possible by throttling the larger.

B.M.W. developed a series of bi-fuel rockets, some using nitric acid as an oxygen carrier and a mixture called Tonka as the main fuel. Tonka is based on a heavy hydrocarbon with the addition of substances permitting spontaneous reaction with the nitric acid. The specific thrust is similar to that of Walter's T- and C-Stoff unit.

**Installation**

Main problems in designing a turbine-cum-rocket fighter, and more especially in adapting an existing turbine fighter for supplementary rocket power, are the stowage of the fuels and the location of the unit, particularly the propulsion nozzle. Various methods of incorporating one or more rockets are possible. A unit may be built into a fuselage or nacelle; or, in some instances, a jettisonable rocket complete with tanks, can be slung under the fuselage.

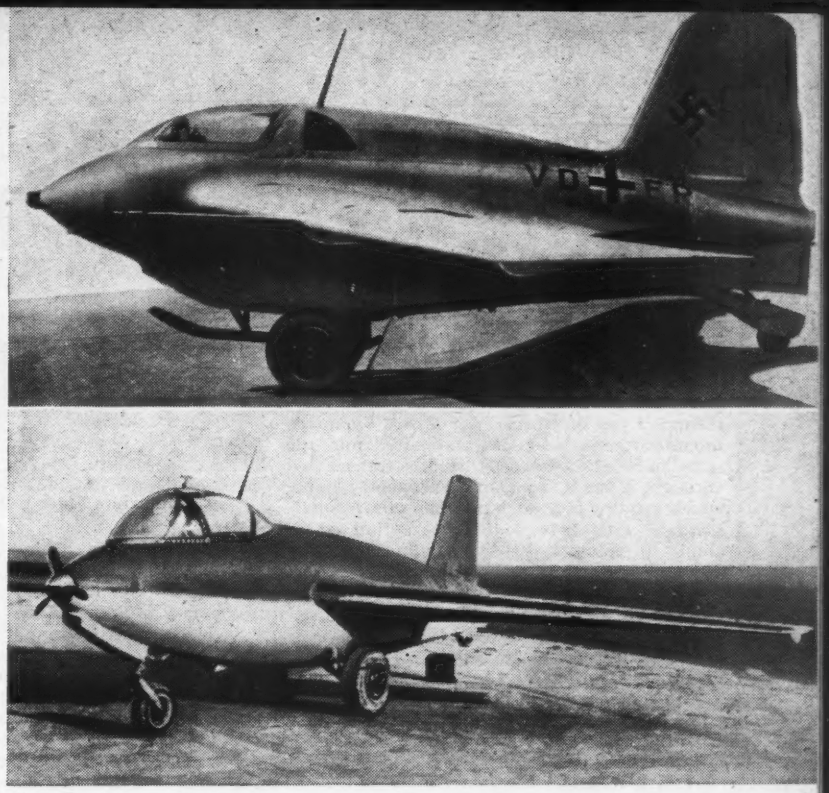
The fighter with outboard gas turbines, typified by the Meteor, Me 262, Bell XP-83, and McDonell FD-1, readily offers itself for an internal fuselage-tail installation. There has been no announcement of a Meteor so adapted, though Mr. Carter, in discussing the layout generally, has mentioned the possibility, and Messerschmitt designed a 262 on these lines. Another 262 turbine-cum-rocket prototype, with two dual-purpose B.M.W. 003Rs, was actually flown, before being reduced to ashes by a faulty rocket.

Use of three rockets, two embodied in the turbine units and one in or under the fuselage, would certainly supply the "overabundance of thrust" mentioned by Mr. Carter as a prerequisite of the modern intercepter. In this case, however, fuel stowage, even for a one- or two-minute duration, might be prohibitive.

Supplementary rockets have not been applied to piston-engined fighters, though design studies were made in Germany, while the Japanese used solid-fuel A.T.O. rockets to increase the approach and impact speeds of fighters adapted for suicide attacks.

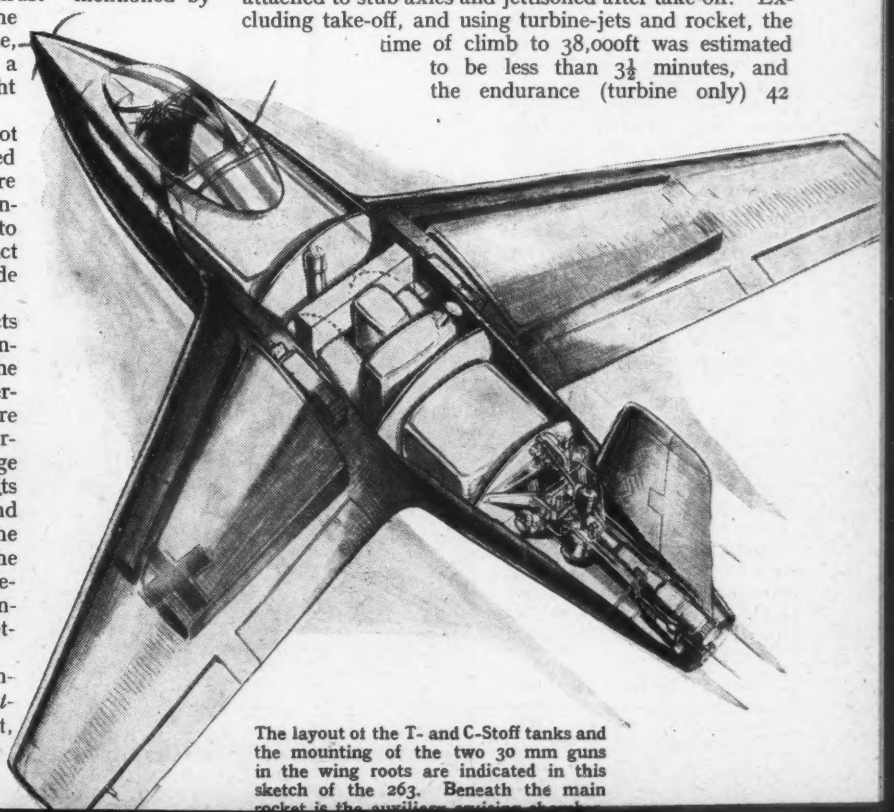
German prototypes, and projects with turbines and rockets, were intended as intercepters, and the rockets, though available for emergency acceleration in level flight were primarily for climb. Estimated performances were such as to challenge the pure-rocket intercepter, with its endurance of 4-15 minutes, and shortly before the collapse, the R.L.M. ordered development of the turbine-cum-rocket 262 to be expedited, as it was felt that it might render superfluous all other target-defence intercepters.

The two variants already mentioned were known as *Heimatschutzer* I and II. The first,



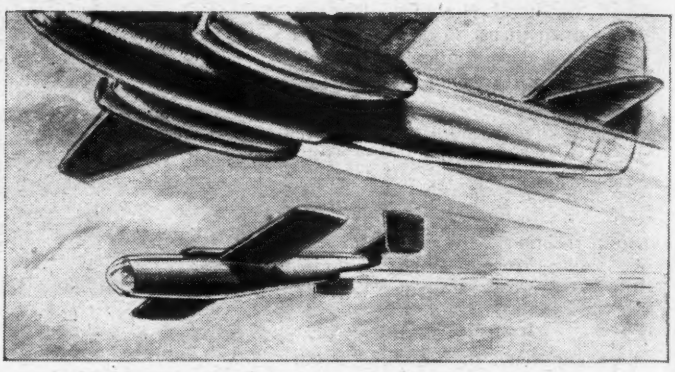
The operational Me 163B (top) and the 163C were developed by Junkers into the 263 (below). The 263's rocket had a cruising chamber to lengthen endurance

with two Jumo 004C on B.M.W. 003 turbine jets, embodied a Walter bi-fuel rocket in the modified tail of the fuselage, the rudder being undercut to clear the efflux. A large proportion of the gas-turbine tankage was displaced by T- and C-Stoff and there was an additional jettisonable tank for T-Stoff under the fuselage nose. The increase in flying weight from 15,500 lb to nearly 18,000 lb necessitated two auxiliary wheels, attached to stub axles and jettisoned after take-off. Excluding take-off, and using turbine-jets and rocket, the time of climb to 38,000ft was estimated to be less than 3½ minutes, and the endurance (turbine only) 42



The layout of the T- and C-Stoff tanks and the mounting of the two 30 mm guns in the wing roots are indicated in this sketch of the 263. Beneath the main rocket is the auxiliary cruising chamber

# ROCKET FIGHTERS



The miniature Arado rocket fighter was to be launched by an Ar 234.

minutes. Six 30 mm low-velocity, high-capacity guns (M.K.108) were specified.

The second design, the first jet fighter to fly with supplementary rocket propulsion, differed essentially from the standard 262 in having two B.M.W. 003R combined turbine and rocket units. The 003R comprises a standard 003 gas turbine unit of 1,760-2,400 lb thrust, according to mark, with a B.M.W. 718 nitric acid rocket weighing 180 lb, and giving 2,750 lb thrust for three minutes, mounted on its rear end and faired into the same nacelle. A special drive is transmitted through a shaft to the rocket-fuel pumps, which require 150-200 h.p. The 262 *Heimatschutzer* with twin 003Rs was estimated to climb to 28,000 ft in two minutes, and sufficient fuel was to be carried for an endurance of one hour at 30,000 ft.

When the rocket-fuels were exhausted at 28,000 ft the climb could be continued for another 3,000 ft with a combination of inertia and turbine-jet thrust, after which the turbine-jets alone would operate. Having thus attained a high speed and high altitude for the expenditure of comparatively little turbine-jet fuel, the machine could then consume the remaining fuel under optimum conditions for maximum range. The rockets could be cut in or out at will, but special control arrangements were necessary to avoid unequal thrusts and a resulting spin.

### Turbine-cum-Rocket Projects

Although development of turbine-cum-rocket fighters was primarily a Messerschmitt concern, Arado and Heinkel had projected variants of the Ar 234 and He 162 (*Volksjaeger*) using the dual-purpose B.M.W. 003R. The 234 was to retain two standard 003 turbine-jets in addition to a pair of "R" units, and with full thrust was to climb to 36,000 ft. in three minutes. The climb of the rocket-assisted 162 should have been slightly better, and endurance was estimated as 45 minutes.

In 1944 Kurt Tank, of Focke-Wulf, had considered a twin-boom fighter similar to the Vampire, with one or two liquid rockets to supplement the Heinkel-Hirth gas-turbine, but abandoned this project in favour of a design which became the Ta 183, likewise adaptable for a supplementary rocket.

Pure-rocket fighters projected or under development in Germany were of three classes —non-expendable intercepters (Me 163, 263 and P.1104, "Julia" and "Walli"); semi-expendable intercepters ("Natter"), and what may be termed special-purpose fighters (e.g., Arado miniature and Zeppelin rammer). Only the Me 163 (sub-type B) became operational.

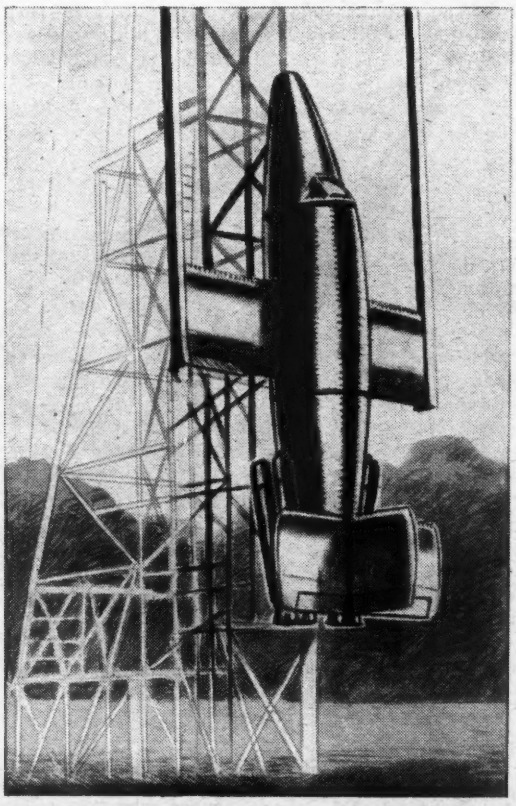
The 163 was basically a Lippisch design, and although developed at the Me works was never favoured by Messerschmitt himself; in fact, quarrels over this machine led to estrangement of the two designers. At first it was produced as a glider (163A) and towed behind an Me 110. A re-design, with an early Walter rocket, became the 163B, which was ordered in quantity and saw action against American day-bomber formations in 1944, though operations were restricted by the bombing of T- and C-Stoff plants.

A 163B is now on view at the Science Museum, South Kensington, and those who missed it at the R.A.E. demonstration will do well to examine it. It will be seen that the swept-back wooden wing has a marked wash-out of incidence toward the tip and, in addition to the "elevons", carries large fabric-covered trimming surfaces. The metal fuselage is made in two halves, the rear part, housing the H.W.K. 509 rocket, being detachable.

The 163B takes off under the power of its own rocket on a twin-wheel undercarriage, which is jettisoned automatically when the landing skid between the wheels is retracted. About 226 gallons of T-Stoff and 110 gallons of C-Stoff is carried in wing and fuselage tanks, and weighs 4,450 lb, accounting for nearly half the all-up weight. Two 30 mm M.K.108 guns with 60 rounds each are mounted in the wing roots.

In service the 163B was limited to a speed of 550 m.p.h.; compressibility at higher speeds initiated a sudden dive. The restricted fuel capacity and lack of a pressure cabin limited the ceiling to 40,000 ft, which height it attained in under four minutes, and the range after climb was 22 miles at 495 m.p.h. Although endurance could be protracted by periods of gliding, the Germans recognized that it was quite inadequate, and the H.W.K. 509C rocket, with a cruising chamber, was developed for the Me 163C, giving an endurance under power of 12 minutes. A slightly larger machine than the B sub-type, this model weighed over 11,000 lb and had a pressure cabin, permitting a ceiling of about 52,000 ft. The maximum designed speed was 590 m.p.h.

In order to leave Messerschmitt free to concentrate on the 262, development of the 163 was passed to Junkers, who re-designed the sub-type C as the 263, with a slimmer fuselage and retractable tricycle undercarriage. It was found possible to provide tankage for about 530 gallons of fuel in eight wing and fuselage tanks, which it was necessary to empty in strict order to minimize c.g. variations. The fuel weighed



"Natter" on the rails of its launching framework. The four A.T.O. rockets are clustered round the tail.

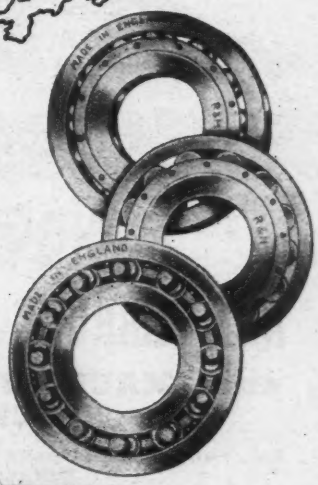
# INITIALS *worth remembering*

**VE** — VICTORY OVER EUROPE

**VJ** — VICTORY OVER JAPAN

BALL & ROLLER R&M BEARINGS

## VICTORY OVER FRICTION



RANSOME & MARLES BEARING CO. LTD. NEWARK ON TRENT ENGLAND

HIGH CLASS SHEET METAL WORK

# V.P. SHEET METAL LTD.

FUEL, OIL AND COOLANT TANKS
FABRICATIONS IN ALL METALS
EXPERIMENTAL AND PRODUCTION

WINDSOR ST. CHELTENHAM PHONE 5805

*Sugar Loaf Mountain* *Rio de Janiero*

BIRSO
TRADE MARK

## NON-FERROUS CASTINGS
### and MACHINED PARTS for AIRCRAFT

Also "BIRSO" CHILL-CAST RODS and TUBES, INGOT METALS, Etc.

B/4

*Fully approved by Admiralty and A.I.D.*

**T. M. BIRKETT & Sons, Ltd.**
**HANLEY - STAFFS**

*Telegrams*: BIRKETT, HANLEY. *Telephone*: STOKE-ON-TRENT 2184-5-6

## AIR TUTORS
### AYR, AYRSHIRE

OPERATED BY SCOTTISH AVIATION LTD., PRESTWICK AIRPORT

offer comprehensive training for civilian airline crews in all aspects of instrument flying and air navigation—courses to suit every grade of proficiency from beginners to special tuition for the new Commercial Air Licences, and combining

**LINK AND INSTRUMENT FLYING AT PRESTWICK AIRPORT**

**Personal Tuition,** employing the most modern methods and devices, is available in the following sections—

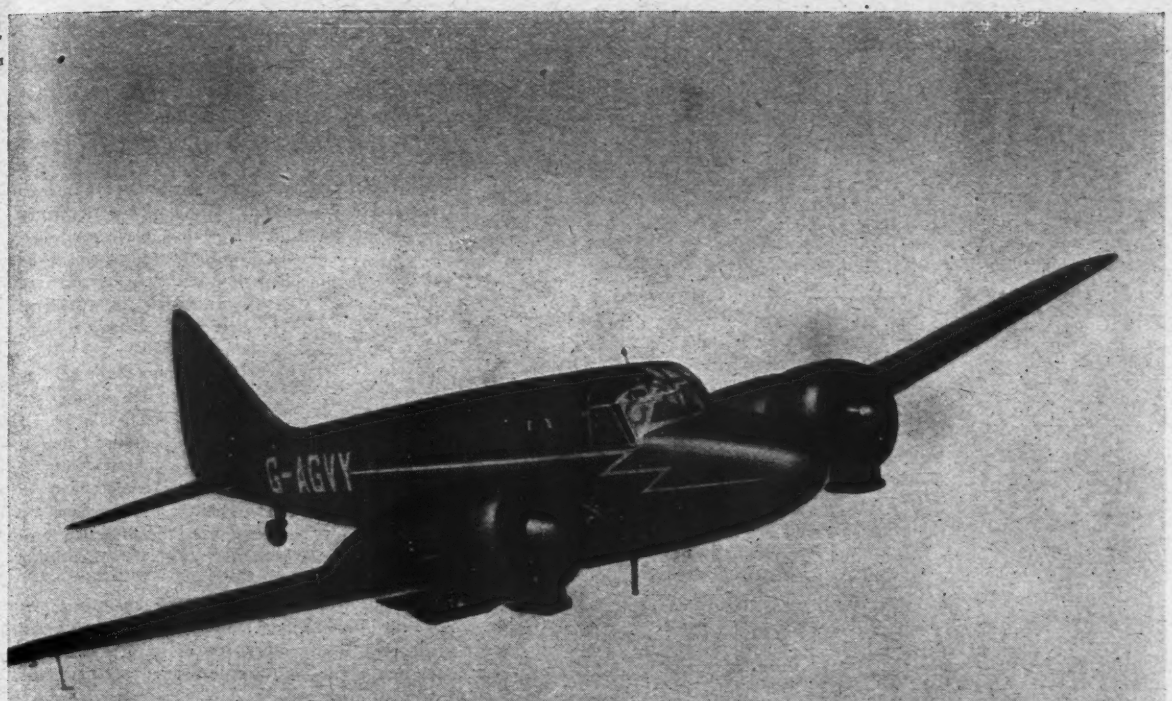
(1) Elementary instrument flying course for beginners
(2) Advanced instrument flying course for Airline Pilots' Licences
(3) Radio range course
(4) Standard beam approach course
(5) Runway localiser course
(6) Flying controllers' course, specially designed to familiarise controllers with methods of radio control approaches

**Postal Tuition,** in the form of three complete postal courses in aerial navigation, is also available to candidates for

(1) Air Navigator's Licence, Second Class
(2) Air Navigators' Licence, First Class
(3) Pilot's Licence, Class "B"

and for the conversion of Royal Air Force Navigators' Warrants to War-Time and Post-War Licences.

Write for full particulars to **AIR TUTORS, AYR, AYRSHIRE,** and state type of course required and stage of proficiency already attained.




*The*

AIRSPEED

# CONSUL

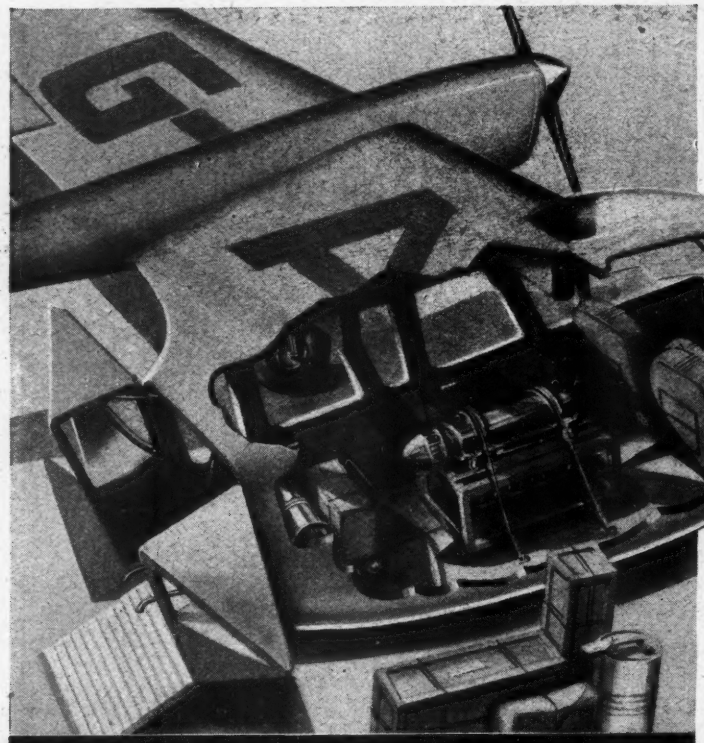
the junior member of the Airspeed family.

A civil conversion of the world-famous Oxford, the standard twin-engine trainer of the Royal Air Force, the Consul is produced to meet the demand of business houses for aircraft for executive travel, charter services and feeder lines. Equipped with the remarkably reliable Armstrong Siddeley Cheetah 10 engines (1,250 hours between overhauls) the Consul is economical to operate, reliable in service and has excellent flying characteristics.

Two crew.
Five passengers and luggage.
Maximum weak mixture cruising speed 165 m.p.h.
Early delivery, £5,500.
Complete except radio.

AIRSPEED LIMITED, PORTSMOUTH & CHRISTCHURCH, ENGLAND
Associated Companies in Australia, Canada, India, Africa and New Zealand

AIRSPEED



PORTSMOUTH AVIATION LIMITED
THE AIRPORT, PORTSMOUTH. TEL: PORTSMOUTH 74374

## *Economical Freighting*

The Aerocar Major will carry a payload of 816 lb. over a distance of 392 miles at 141 m.p.h., a performance which makes light freighting really pay.

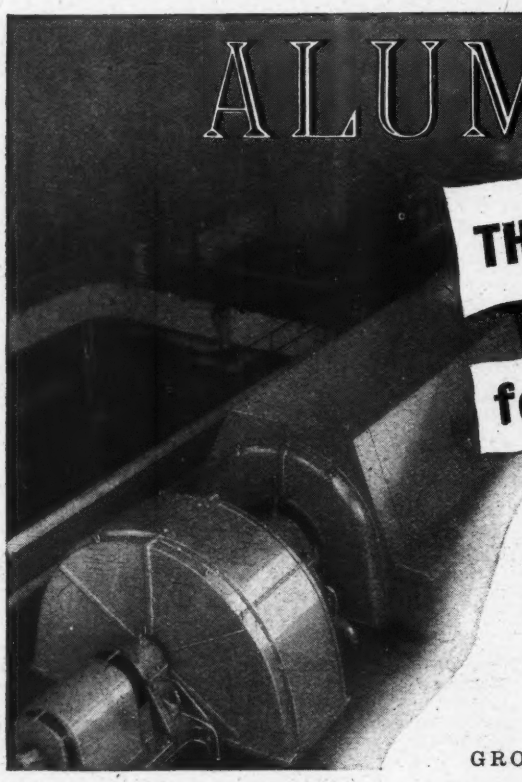
Awkward or bulky goods may quickly be loaded into the Aerocar's large cabin through the additional clam-shell doors at the after end.

The designers of the Aerocar have operated airlines for many years and have produced this multi-purpose aircraft with a full understanding of operators' problems. Economy of operation has been the first consideration, with easy maintenance and repair (so necessary to maintain maximum yearly flying hours) a close second.

Ultra-comfortable seats, which may be installed or removed in a matter of minutes, add to the general usefulness. Many other special features are fully described in the illustrated brochure which will be forwarded upon request.

THE PORTSMOUTH **Aerocar**

---



# ALUMINIUM

## THE METAL OF THE MOMENT

## for Electrical Development

Aluminium the metal that is available *now* in inexhaustible quantities. The metal with the exceptional properties of high strength and low weight; that is rustproof, durable and decorative. In the whole range of electricity production, from power station over power lines to domestic heating and lighting and public traction, aluminium has innumerable uses. And its price has now fallen to nearly 30% below the pre-war level. Have you explored the potentialities of aluminium and its alloys? *Ask us about uses and supplies.*

**ALUMINIUM UNION LIMITED**

*A fully-owned subsidiary of Aluminium Limited, Montreal, Canada*

GROSVENOR HOUSE, PARK LANE, LONDON, W.1

## ROCKET FIGHTERS (CONT.)

6,400 lb and accounted for more than half the flying weight, giving an endurance of about 15 minutes at 495 m.p.h. Despite the reduction of weight at landing to 5,700 lb, the touch-down speed was a good 90 m.p.h.

To a special target-defence specification calling for a small, cheap rocket-fighter, Junkers designed the "Walli," or EF 128, with a span of only 20.6ft and a weight of 6,100 lb, including 3,500 lb of rocket fuel. The sea-level rate of climb was to be 26,000 ft/min, and the endurance 9½ minutes. "Walli" was to take off on a tricycle undercarriage, but would land on a long faired skid.

A more spectacular design, known as "Julia" or P.1077, was submitted by Heinkel. With an even shorter span (15 ft), but weighing nearly 4,000 lb, "Julia" would be assisted off by four solid-fuel rockets, each with a thrust of 2,600 lb for 10 seconds. An initial rate of climb of 40,000 ft/min, and a climb of 49,000 ft in 72 seconds, were estimated, and at 500 m.p.h. the endurance would be five minutes. The pilot lay prone and was to land the machine on skids at more than 100 m.p.h. Messerschmitt's corresponding proposal, the projected P.1104, had a 70 sq ft wing area and a designed rate of climb of 39,000 ft/min at sea level. Unlike "Walli" and "Julia," which were to be armed with two 30 mm guns, it was to have a single M.K.108.

The designers of the Bachem BP 20B, or "Natter" (shown sectioned in *Flight* of Oct. 4, 1945) were even more enterprising. As closely akin to a directed missile as to a fighting aircraft, "Natter" (Viper) measured 13ft in span and weighed 4,900 lb, including four A.T.O. rockets. It was to have an initial rate of climb of over 37,000 ft/min, after a vertical launch from the framework shown in the accompanying sketch. The flight was to be directed from the ground, according to radar plots, and the pilot was responsible for controlling the machine for the last few hundred yards to the target and for firing a salvo of R4M rocket projectiles or exhausting the ammunition for a pair of M.K.108s. This mission completed, he would jettison the rear portion of the fuselage, with its 509 rocket, which would descend by parachute, and eject himself smartly from the expendable remainder. As originally planned, the whole aircraft was to be sacrificed. Several unmanned launches were made, but the first and only piloted take-off was disastrous. Production orders were cancelled.

"Special-purpose" rocket fighter projects included a miniature Arado with prone pilot, to be launched by a turbine-jet Ar 234, and a Zeppelin design for ramming or R/P attacks, using a solid-fuel rocket and resembling in this respect the Japanese "Baka."

Such designs were admittedly products of emergency and, had the war situation been less critical, development would doubtless have been concentrated on the more rational 263 and 262 *Heimatschutzer*.

Experience with rocket fighters, though limited, encouraged D.F.S. to design, and Siebel to start building, the 346 supersonic research aircraft with two Walter rockets, to attain over 1,000 m.p.h. between 60,000 and 100,000 ft. Apart from providing aerodynamic data, which might have influenced the whole trend of aircraft design, the 346 and its stable companion the 228 rocket-propelled reconnaissance machine, a prototype of which was built and flown, might well have bred an entirely new line of rocket fighters.

# CONVAIR 240 POWER PLANT

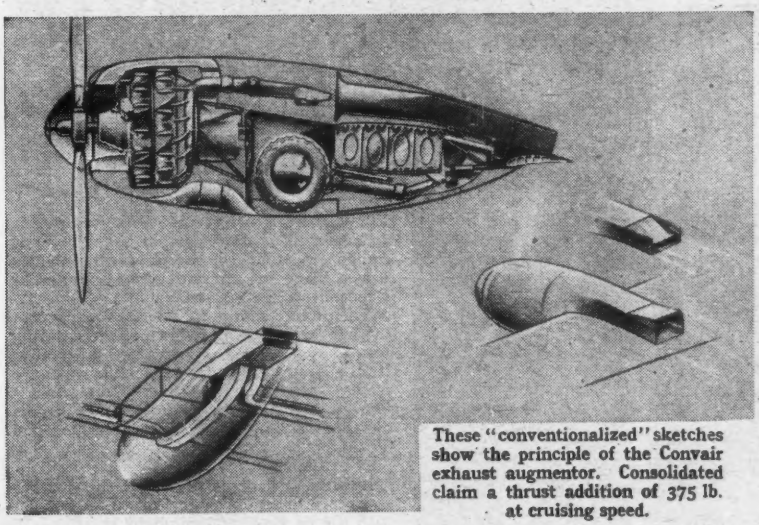
THE 40-seater Consolidated Vultee 240 twin-engined aircraft, of which, it is reported, American Airlines have ordered no fewer than a hundred, incorporates a rather ingenious form of power plant.

The engines are Pratt and Whitney R-2800s of 2,100 h.p. each and these are housed in sealed nacelles having the normal annular inlet at the front, but only a ducted outlet at the rear. The engine exhaust is collected in an annular duct having a discharge nozzle arranged immediately forward of an augmenter throat at the forward end of the outlet duct. The jet effect of the exhaust flow through the nozzle entrains air into the augmenter throat, thus creating a low pressure area which the cooling airflow through the engine attempts to fill; this action is continuous so long as the engine is running. The aspirating action of the exhaust increases in proportion to exhaust gas flow, so that engine cooling airflow is automatically proportional to engine output.

The use of this system results in a useful thrust as a result of energy recovered, the thrust increment being estimated at approximately 375 lb, which is said to amount to 255 thrust h.p. at cruising speed.

The combination of exhaust gas and cooling air give a temperature of 360 deg. F. toward the rear of the augmenter, and flush scoops in the bottom of the augmenter are incorporated to abstract heat for cabin heating and thermal anticing. As the scoops entrain a mixture of exhaust gas and air it is necessary to have a secondary heat exchanger for cabin heating, the weight of which is said to be considerably less than that of an exchanger capable of supplying heat for wings and cabin.

In the meantime some new estimated performance figures and other information has been issued by Consolidated. The 240—which can be considered as an enlarged version of the 100 now nearing completion—is expected to have a "cruising" speed of 307 m.p.h. at 82 per cent maximum power. Exhaust jet augmentation will contribute about 10 m.p.h. to this figure. Both types will have self-contained entry stairways—forward of the wing in the case of the 240, and at the rear in the case of the 110. The gross weight of the 240 is estimated at 36,000 lb, the payload at 8,500 lb, the range at 700 miles, and the stalling speed at 86 m.p.h.



**These "conventionalized" sketches show the principle of the Convair exhaust augmentor. Consolidated claim a thrust addition of 375 lb. at cruising speed.**

## "BRITAIN CAN MAKE IT"

GOOD progress is being made with the section devoted to aircraft in the Government's "Britain Can Make It" Exhibition, opening in London in September. Support is being given by Government departments, the Society of British Aircraft Constructors and leading firms in the industry.

The Council of Industrial Design is responsible for the organization.

# CIVIL AVIATION

## APPOINTMENT

A FURTHER appointment to the Ministry of Civil Aviation was announced by the Minister recently. Mr. H. G. Vincent, C.B., C.V.O., is to become Under-Secretary of the Ministry in charge of policy and administration. Mr. Vincent, who has had a wide experience of the Civil Service, was private secretary successively to Lord Baldwin and to Mr. Ramsay MacDonald from 1928 to 1936. He served on the Combined Production and Resources Board in Washington from 1944 to 1945, and recently acted as British Secretary of the Anglo-American Palestine Committee.

## P.I.C.A.O. DELEGATION

THE appointment of Sir Donald Banks, K.C.B., D.S.O., M.C., to lead the U.K. delegation to Montreal for the Assembly of P.I.C.A.O. which began on May 21, was announced by the Minister of Civil Aviation a few days before the delegation was due to leave. He will work in association with Air Chief Marshal Sir Frederick Bowhill, who is the permanent U.K. member on P.I.C.A.O.'s interim council. In addition to Sir Donald Banks, the delegation is composed of Mr. H. G. Vincent, C.B., C.V.O., Air Vice-Marshal A. C. Collyer, C.B., C.B.E., and Mr. L. J. Dunnett, with Mr. R. W. N. B. Gilling acting as secretary. Technical and legal advisers are attached to the delegation. The alternative members of the main delegation include Air Chief Marshal Sir Frederick Bowhill, Air Comdre. J. O. Murray and Mr. Peter Masefield.

Sir Donald Banks, who was Director General of the Petroleum Warfare Department which organized the use of flame weapons and the development of Fido and Pluto, was a member of the U.K. Trans-Atlantic Air Mission to Ottawa and Washington in 1935. From 1934 to 1936 he was the first Director General of the Post Office, and subsequently Sir Donald served as permanent Under-Secretary of State at the Air Ministry until 1939.

## EXTRA AIRCRAFT

ANOTHER two DC-4s have been ordered by K.L.M. Royal Dutch Air Lines so that they may be able to maintain the expansion of their inter-continental and transoceanic services. When these additional aircraft have been delivered K.L.M. will have a fleet composed of twenty-four DC-3s, sixteen C-54a Skymasters, six civil DC-4s, four Constellations, and six D.H. Dominies.

## EMPTY SEATS

DURING the fortnight ending April 27, the percentage of empty seats on the B.O.A.C. services to Brussels, Paris and Copenhagen, was 11.8. This figure was given by the Parliamentary Secretary to the Ministry of Civil Aviation in a reply to a question in the House of Commons on May 8. He added that he did not consider the figure alarming, as, in normal peacetime operations, 60 per cent would be considered a good load factor.

## NEW SUDAN AIR COMPANY

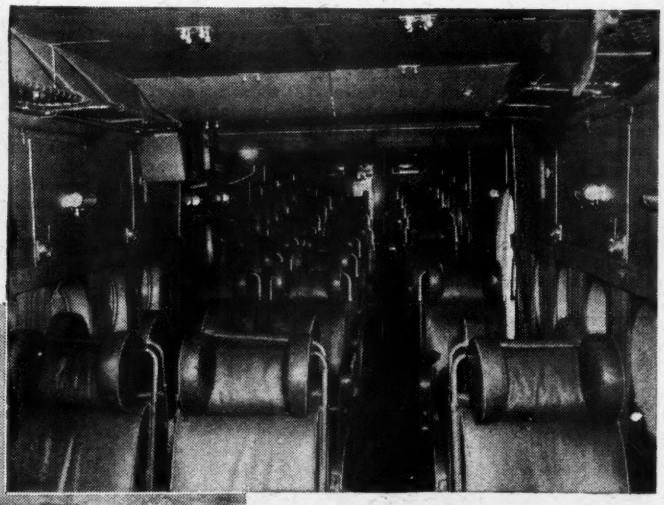
THE Sudan Government has decided to form Sudan Airways with the object of developing internal air services within the Sudan, a territory which covers 1,000,000 square miles and which has only limited communications. The Sudan Government will provide the capital, whilst Messrs. Airwork, Ltd., the founders of Heston Airport, will be responsible for the flying and technical services on a management basis, the Sudan railways handling the passenger and freight services.

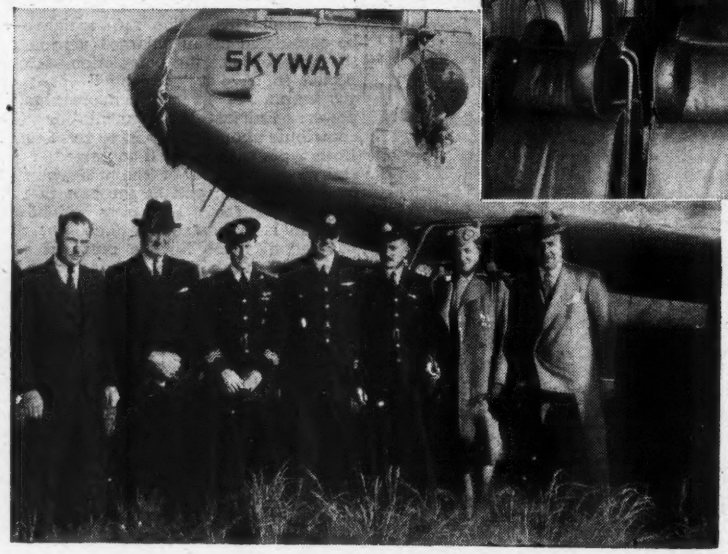
At first, four Doves (D.H.104s) will be used, fitted with medium and high frequency radio and direction finding apparatus, and they will operate over four internal routes radiating from Khartoum. The routes are via Atbara, Kareima* and Dongola* to Wadi Halfa; via Kosti,* Malakal, Wau, and Yirrol* to Juba; via El Obeid, Nahud, and El Fasher to El

## WORLD-WIDE CHARTERS

**THE York belonging to Skyways, Ltd., which was christened *Skyway* on Monday, May 13, left this country the following day on its first trip for the company. The aircraft flew to Basra and back on charter for the Anglo-Iranian Oil Company, which has long made a practice of flying its personnel and urgent freight between the U.K. and the Middle East.**

**Skyways, Ltd., which will offer a world-wide charter service, has been formed by Sir Alan Cobham and Capt. Ashley, previously a B.O.A.C. senior pilot, with Brigadier General A. C. Critchley, the former Director General of B.O.A.C., as chairman of the company. Lt. Cdr. Castlemaine has, we hear, just left the R.N.V.R.**



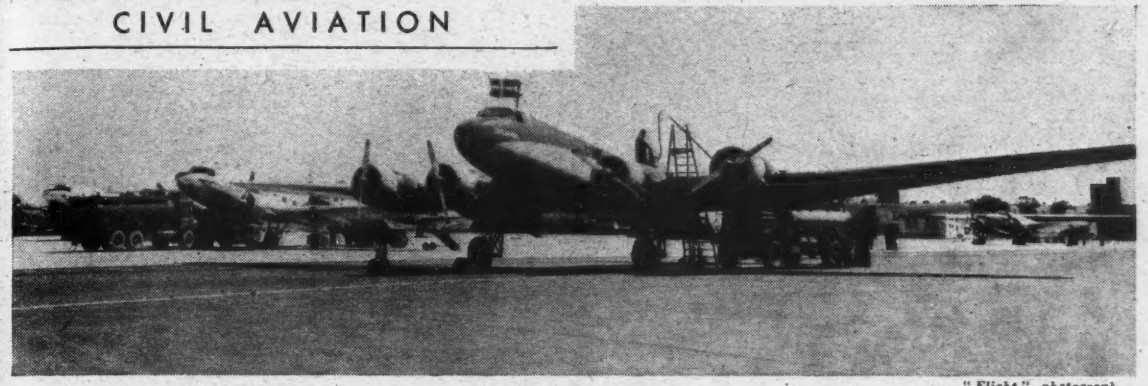



**to become the company's commercial manager. The offices are at 175, Piccadilly, London, W.1, and the company will ultimately use a fleet of aircraft comprising Yorks, Lancastrians, Doves and Rapides.**

**The picture shows the interior arrangement of the York *Skyway*, which provides seating for 30 passengers in considerable comfort. In the group in the lower photograph are, reading from left to right, Capt. Ashley, General Critchley, G. T. Ross, Capt. Blythe, Capt. Coleman, Miss Carol Pearce, and Sir Alan Cobham. Capt. Blythe is the chief pilot of the company.**

**Incidentally, the first of all air charter services was organized by Sir Alan Cobham with the de Havilland company in 1921.**

# CIVIL AVIATION



"Flight" photograph.

**VISITOR ONLY: A Focke-Wulfe Condor belonging to D.D.L., the Danish Airline company refuelling alongside B.O.A.C. Dakotas at Northolt last week when it was on a special flight to this country. It is the remaining one of the two Condors which were in operation with D.D.L. before the war. A picture showing a part of the interior appears on page 526.**

Geneina; and a circular route via Atbara, Port Sudan, Kassala, and Gedaref.* The starred ports of call are "request" stops only. Each of the services will, so far as possible, be scheduled to link up with other important transport services.

## *THE AIR GUIDE AGAIN*

THE well-known *Bradshaw's British and International Air Guide*, which was first published in November, 1934, has now been re-published for the first time since the outbreak of the war. The new "Air Bradshaw" follows to a great extent the layout of that of pre-war days, but it is a larger and more imposing edition. It is well produced and includes some nine pages of air-route maps. With civil air lines subject to such constant changes as they are at present, the task of the publishers in compiling the new Bradshaw must have been an extremely difficult one. It is being produced monthly, and the cost is 3s.

## *IN THE HOUSE . . . .*

IN written answers to various questions in the House of Commons on May 15, Mr. Ivor Thomas, the Parliamentary Secretary to the Ministry of Civil Aviation, made the following points:—

**EIRE AGREEMENT**

The agreement provides that all scheduled air transport services terminating in the territories of the United Kingdom and Eire should be operated by the joint company, Aer Lingus, in which both the United Kingdom and Eire operators participate. This joint company would have rights of cabotage between Dublin and the Shannon, similar to those permitted between Belfast and Liverpool and between Belfast and Crewe. Any arrangement to the contrary would have to be by agreement between the two Governments.

**SCOTTISH ROUTES AND AIRFIELDS**

Scotland is now served by fourteen routes within Scotland and the Islands, and by five routes to points outside Scotland. A total of 162 services operate each week on these nineteen routes, and the total daily route mileage on the services which operate within the United Kingdom is 6,700 miles. Civil aircraft are now permitted to operate from the following nineteen airfields in Scotland:—

**Schedule services only:** Aberdeen (Dyce); Inverness; Islay (Port Ellen); Kintyre (Machrihanish); Kirkwall (Hatston); Renfrew; Sumburgh; Wick.
**Charter aircraft:** Dumfries, Leuchars.
**Schedule services and charter:** Lossiemouth; Turnhouse.
**Charter and club flying:** Balado Bridge.
**Club flying:** Macmerry.
**All types:** Benbecula; Perth (Scone); Prestwick; Stornoway; Tiree.

Prior permission has to be obtained from the Station Commander before landing at Dumfries, Leuchars, Lossiemouth and Turnhouse, as these stations are still under Service control.

**CATFOSS AIRFIELD**

It is not possible to forecast when Catfoss will be available as an airfield for the Hull area. Before the airfield can be used by scheduled civil air services, existing buildings will have to be substantially modified and signal facilities provided. Representatives of the Ministry of Civil Aviation are visiting the airfield this month to consider these matters.

## *SUNDERLAND STORY*

OF the two Sunderlands for which some of the delivery story was told in the issue of May 9, only the first was, we now hear, for delivery to the Uruguayan Company C.A.U.S.A. The second, in which the managing director and aviation co-director of the insurance company travelled, went to Buenos Aires for use by an Argentine operator. These Sunderlands are 40-seaters.

## *THE T.W.A. DISPUTE*

THE dispute about the proposed agreement between Trans-World Air Lines and the Italian Government, which would enable the former to establish an air transport system in Italy has now, it seems, gone one step further. The State Department of the United States is reported to have notified T.W.A. that Washington cannot agree unconditionally to intercede with the Italian Government for the establishment of such an air transport system so long as the proposed agreement gives exclusive rights for such operations. If, however, the contract omitted the provision of "exclusive rights" the State Department would be prepared to urge the Italian Government to implement the plan.

The difficulty has arisen as a result of a complaint by the British Government that exclusive rights would prohibit British European Airways from participating in such services. Apparently, therefore, the State Department is upholding the British complaint. It is reported that, in a note to the British Embassy in Washington, the State Department has pointed out that, if the contract is modified as suggested, it would be pos-

### *WHERE YOU MAY REFUEL*

*"FLIGHT" has recently published lists of the airfields where "coupon" fuel may be obtained by the civil pilot. Here is a consolidated and up-to-date list of such airfields, with the octane value of the fuel stocked and the names of the suppliers.*

| Airfield | Octane Grade Stocked | Supplier |
|---|---|---|
| Broxbourne ... ... | 87 : 73 | Herts and Essex Aviation. |
| Cambridge ... ... | 73 | Marshall's Flying School. |
| Croydon ... ... ... | 100 : 87 : 73 | Ministry of C.A. |
| Derby ... ... ... | 87 : 73 | Air Schools. |
| Fair Oaks... ... ... | 73 | Air Training. |
| Hanworth ... ... | 73 | London Air Syndicate. |
| Hurn ... ... ... | 100 : 87 : 73 | Ministry of C.A. |
| Luton ... ... ... | 87 : 73 | Luton Corporation. |
| Lympne ... ... ... | 87 : 73 | Ministry of C.A. |
| Northolt ... ... ... | 100 : 87 : 73 | Ministry of C.A. |
| Perth ... ... ... | 87 : 73 | Airwork. |
| Peterborough ... ... | 73 | Morrison's Aircraft Services. |
| Prestwick ... ... | 100 : 87 : 73 | Ministry of C.A. |
| Portsmouth ... ... | 73 | Portsmouth Aviation. |
| Ringway ... ... ... | 87 : 73 | Manchester Corporation |
| Rearsby ... ... ... | 73 | Auster Aircraft. |
| Speke ... ... ... | 73 | Ministry of C.A. |
| Southampton (Eastleigh) | 87 73 | Southampton Corporation. |
| Sherburn-in-Elmet ... | 73 | A. G. Wilson. |
| Tollerton ... ... | 87 | Tollerton Aircraft Service. |
| Walsall ... ... ... | 87 : 73 | Helliwells. |
| Whitchurch ... ... | 100 : 87 : 73 | Ministry of C.A. |
| Wolverhampton ... | 73 | Wolverhampton Flying School. |
| Weston-super-Mare ... | 87 : 73 | Western Airways. |

*The current prices in England, Wales and southern Scotland, for bulk wholesale and retail fuel respectively are: 100 Octane, 2s. and 2s. 3½d.; 87 Octane, 1s. 10d. and 2s. 1½d.; and 73 Octane, 1s. 9d. and 2s. 0½d. per gallon.*

# CIVIL AVIATION

sible for the Italian Government to enter into any further arrangement which it deemed advisable if it wished to provide for the establishment of a joint British and Italian company to operate air transport services between points in Italy.

## *NEW YORK—LONDON*

A SIMULTANEOUS arrival at the London Airport at Heathrow is planned for a Constellation of Pan American World Airways and an American Overseas Airlines' Skymaster on May 31. The two aircraft will reach the airport at about 1 p.m. at the conclusion of their transatlantic flights. This event will mark the opening of the London Airport to American airline traffic and the inauguration of regular scheduled passenger services to the airport by Pan American and A.O.A. It is hoped that Mr. Averell Harriman, the United States Ambassador, will be present when the aircraft land.

## *CONSTELLATION C. OF A. VALIDATED*

FOLLOWING upon our recent Editorial Comment, we have received the following from Mr. T. R. Thomas, secretary of the Air Registration Board:—

"In the Editorial columns of the May 9th issue of *Flight*, reference was made to the ultimate load factor of the Lockheed Constellation. It was suggested that, at an all-up weight of 90,000 lb, the load factor would be approximately 3.5 and that this would be unfair to British manufacturers, who are expected to comply with the minimum load factor of 3.75 of British Civil Airworthiness Requirements.

**DEFLATED: The Rt. Hon. John Wilmot, M.P., (left) coming down the gangway after a flight from Northolt to Woodford in the pressurised Avro Tudor I. During the journey a height of 20,000 ft. was reached, but the equivalent height in the cabin never exceeded 7,000 ft. Behind Mr. Wilmot is Mr. T. O. M. Sopwith and on the right is Mr. A. Woodburn, M.P. Sir Roy Dobson is on the top of the gangway.**

"The Board has now recommended the validation of the certificate of airworthiness issued by the Civil Aeronautics Administration for the first of the five B.O.A.C. Constellations. The Board is satisfied, after studying the documents recently received from the C.A.A., that at an all-up weight of 90,000 lb, this being the maximum weight at which the aircraft is likely to operate, the load factor is 3.75, and not 3.5. The figure of 3.75 is the minimum specified for large aircraft, both by the Board and by the C.A.A. It is also the figure agreed recently at Montreal by the Airworthiness Division of P.I.C.A.O. There is thus no question of penalising British design.

"In order to maintain the factor of 3.75 at weights in excess of 86,250 lb., certain operating limitations are necessary in the distribution and use of fuel in the various tanks, but these limitations are not likely to be restrictive to the operator."

## *STILL FASTER*

LAST week-end, British South American Airways once again accelerated their service, this time on the return journey from Buenos Aires to London. Their night stop in Lisbon has now been eliminated, so that the aircraft leaving Buenos Aires on Saturday will arrive in London on Monday evening instead of Tuesday mid-day as was the case previously.

## *MERCHANT ADVENTURERS*

COMMERCIAL travelling by air is being undertaken by Sqn. Ldr. G. A. Reston and Mr. W. J. Brind, who have left this country in a Percival Proctor I for Egypt, Palestine, Syria, Baghdad, Cyprus, and South Africa. They have started their own export business, Tradewinds (London), Ltd., and have purchased the Proctor so that they can conduct their own export drive for orders in the various countries which they are visiting. The Proctor was reconditioned by the Field Consolidated, Ltd., at Hanworth. Both Reston and Brind are ex-R.A.F. pilots, and the former was a test pilot for the Bristol Aeroplane Co. both before the war and since 1944, when he returned to the company.

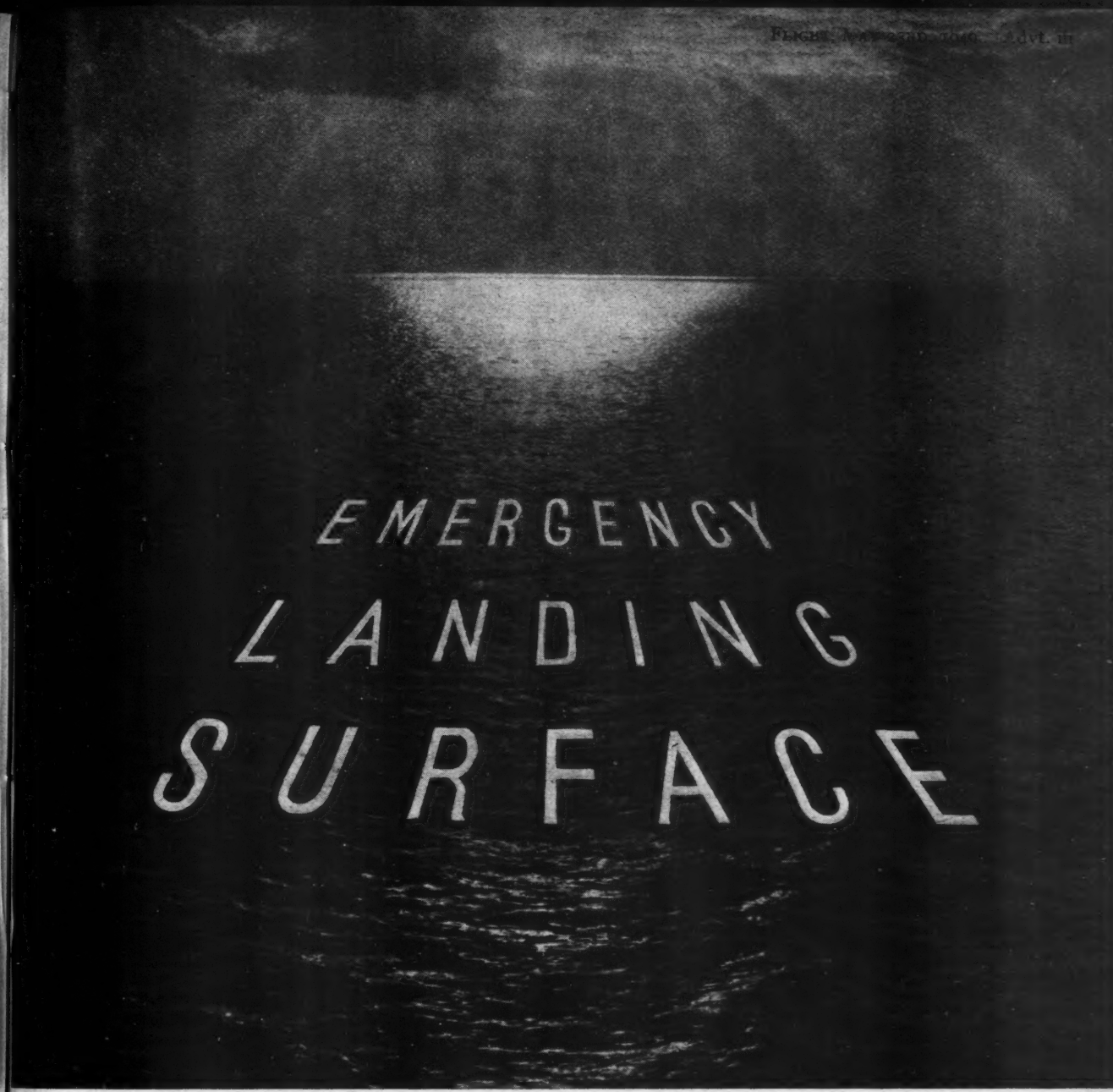
*"Flight" photograph*

**TWENTY-FOUR SEATER: An interior view of the D.D.L. Condor which visited Northolt last week. It seats twenty-four passengers and carries a crew of four. Normally it is used on the daily return service between Copenhagen and Oslo Another photograph of the aircraft appears on the previous page.**

## *TO PERSIA—PERHAPS?*

THERE is now a weekly B.O.A.C. service from the U.K. to Teheran (Persia), via Rome, Athens, Nicosia (Cyprus), Beirut (Syria), Lydda (Palestine) and Baghdad (Iraq). The service leaves Northolt every Thursday morning and arrives in Teheran on the following Saturday, night stops being made at Rome and Lydda. Similarly, the return service leaves Teheran each Thursday and arrives at Northolt on Saturday. Dakotas are used as far as Athens and Lockheed Lodestars from Athens to Teheran.

This new service, however, appears to be of little immediate benefit to the public, for all bookings beyond Athens may be made *only* for Government priority passengers. For the journey as far as Athens there are six non-priority seats available and to Rome two, but even these are fully booked until the end of June.




SUPREME FOR OCEAN TRAVEL — THE BRITISH FLYING BOAT

A HUNDRED MILES or more from port, but the pilot of the large flying boat can see in his mind's eye those comforting words "Emergency Landing Surface." And so can the passengers.

★ ★ ★ ★

Passengers may not be technicians, but they know enough about ships and flying boats to realise that seaworthiness increases with size. Waves which would be a menace to a small boat are mere ripples to a liner.

★ ★ ★ ★

Flying boats which we have under design will be of such size, structural strength and seaworthiness that they will find safe emergency landing surfaces over a large proportion of the routes they serve. In practice the emergency may never arise, but what a sense of security those vast natural landing surfaces will give to all concerned—crew, passengers and operators!

# SAUNDERS-ROE

*Designers and builders of British flying boats — Saunders-Roe Ltd., 45, Parliament Street, London, S.W.1. Telephone: Whitehall 7271*

"You were saying" *remarked the designer,*

## "The Decca Navigator

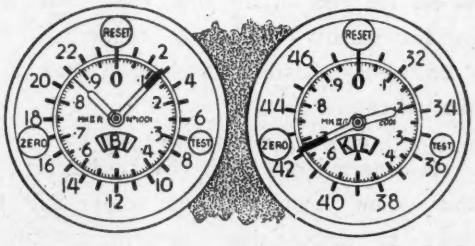
weighs only 25lbs. and is stowable anywhere."

"That's so, but you can, of course, mount the position indicating dials, with their remote controls, anywhere you wish."

The Decca system of radio navigation by

***instantaneous dial readings***

related to a standard chart printed with the Decca *grid* provides a pilot with his precise geographical position continuously, regardless of weather or altitude.

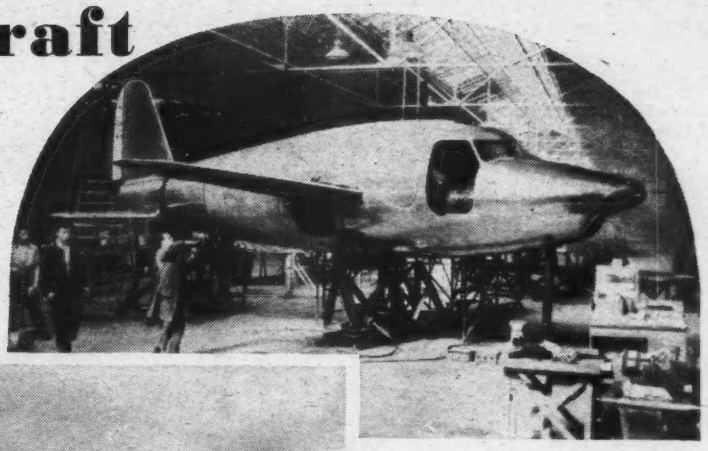



The Decca Navigator Company Limited, 1-3 Brixton Road, London, S.W.9

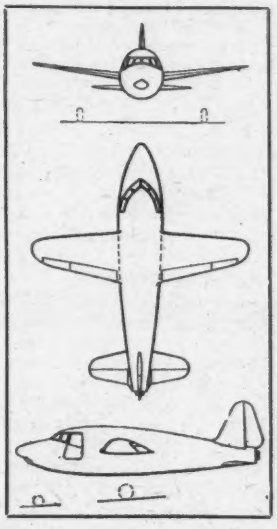
*Telephone:* Reliance 3311 *Telegrams and Cables:* Decnav, London

# Civil Aircraft In France

## *Some Impressions of the Types Being Produced by the French Industry*



The experimental jet-propelled SO-6000 prototype, shown above, will be powered with a German Jumo 004 unit. The nose intake shape is interesting. Somewhat advanced in layout, the S.U.C.10 four-seater on the left was shown at the Toussus le Noble light aircraft meeting. Below are general arrangement drawings of the SO-6000.



THE French financial crisis, which has caused drastic reductions in the 1946 budget estimates, will have a serious effect on aircraft production in France. The contracts for most of the important types now in production have been cut. In the case of transport aircraft alone these cuts involve orders for 50 Goelands, 25 of the four-motor S.N.C.A. Languedoc 161s, 20 four-engined SE-210s and 80 of the SO-91 and SO-93 series. In all, the contracts for some 1,700 aircraft have been scrapped.

Meanwhile, the first of the 22-ton Languedoc 161 transports ordered for Air France (and seen last week in this country) has just completed a long-distance test flight before being handed over. Captained by an Air France pilot, M. Dufour, it returned to Paris on April 23rd, having flown some 12,430 miles to East Africa and back. Since it covered the last leg of the journey, from Dakar to Paris, at an average speed of 240 m.p.h., the Languedoc 161 promises to be a most useful interim transport. On the Continental day version provision is made to carry 33 passengers and 2,400 lb of freight. A 161 fitted with Pratt and Whitney Twin Wasps is nearing completion and it is hoped, finally, to obtain Bristol Hercules for installation in the type.

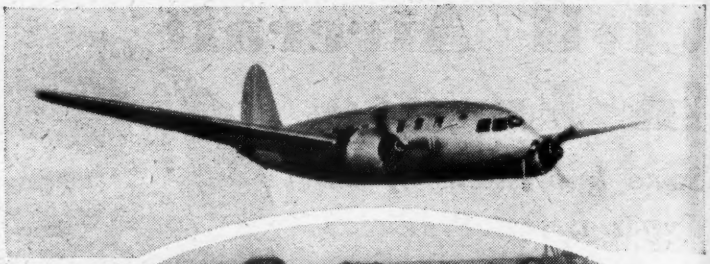
The prototype of the experimental jet-propelled SO-6000 is nearly ready and, all being well, it should be test-flying before the end of this month. It will be handled by M. Daniel Rastel, a pilot of the Alsace fighter group which fought with the R.A.F. during the war. This prototype was to have been powered by a Rateau jet unit, designed in France, but, unfortunately, this will not be ready in time and a Junkers Jumo 004 will be used. The second aircraft will have a Rolls-Royce Nene engine, the licence for which has been acquired by Hispano-Suiza. The designers of the SO-6000 expect the first prototype to fly at about 530 m.p.h., so subsequent Nene-engined aircraft, with about three times the Jumo's thrust, should be well worth watching.

First Air France aircraft to visit this country since the liberation, the Languedoc 161, seen at Northolt, cruises at 230 m.p.h.

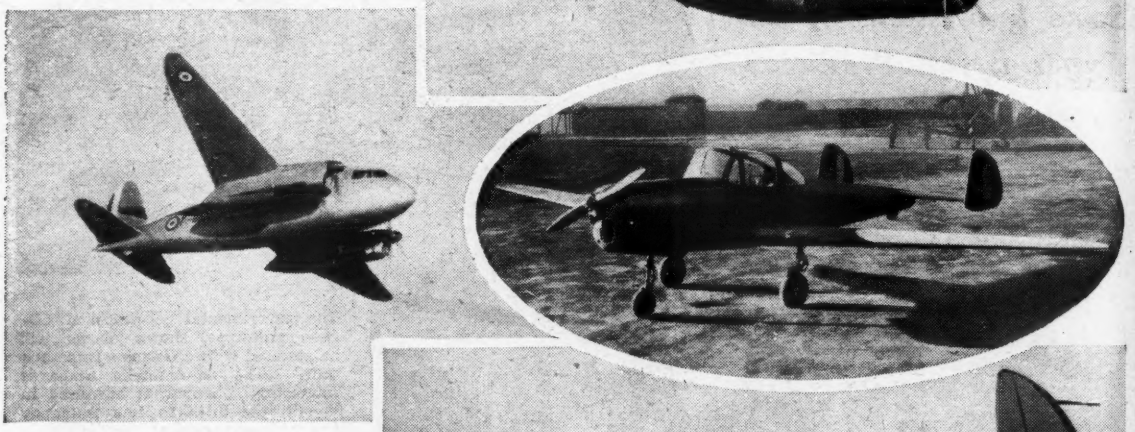
A French transport which should do much towards putting Air France back on the air map is the twin-engined SO-30R, which has just completed its test flights in Brittany. A second aircraft, fully equipped for transport operation, is now being completed and should be ready by July when it will set out on a sales tour of European capitals. Thirty SO-30Rs transports have already been ordered by French airlines.

This type, which has two 1,700 h.p. Gnome et Rhone 14R engines, will carry 30 passengers at a cruising speed of 275 m.p.h. It is thus in much the same class as the Vickers Viking. The following details of its dimensions and performance have been given: Span, 84ft; max speed,

# CIVIL AIRCRAFT IN FRANCE



On the right and below, respectively, are the SO-30R medium-size, and the SO-94 light transports. The former carries 30 passengers.



Somewhat similar to the British G.A. Cygnet, the Max Holste MH.52 two-seater in the centre on the right was shown at the Paris meeting. The lower picture shows the tailless SE-2100 two-seater which was originally developed for experimental purposes. It follows "conventional" tailless lines.

339 m.p.h.; unloaded weight, 21,759 lb; total payload, 9,921 lb; and all-up weight, 36,166 lb.

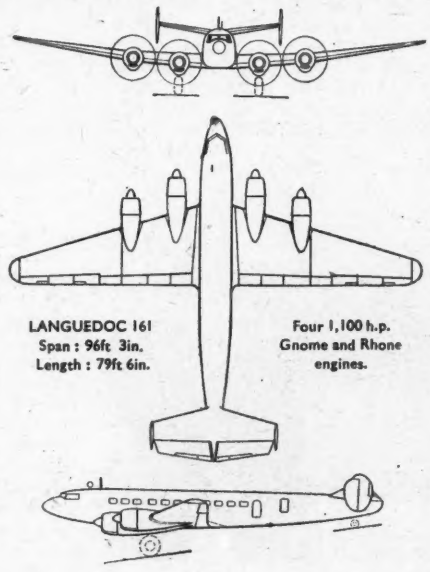
Among the new S.N.C.A. aircraft is the twin-engined SO-94 mailplane. This aircraft is a slightly modified version of the SO-93, an early prototype of which was stolen from under the noses of the enemy in 1943 and flown to North Africa, then in Allied hands. Like its predecessor, the SO-94 has two 600 h.p. Renault 12.S engines; the chief difference lies in a redesigned cargo space to allow an increase of payload from 2,640 lb to 3,960 lb. The undercarriage had to be modified to allow for the increased all-up weight. The SO-94 can be fitted out as a nine-seater passenger transport. The figures for the SO-93 are: Span, 52ft; max. speed (8,000ft), 280 m.p.h.; cruising speed (5,000ft.), 233 m.p.h.; landing speed, 72 m.p.h; range, 745 miles; and service ceiling, 21,300ft.

### Private Aircraft

At the Easter Monday exhibition at Toussus le Noble, near Paris, the aircraft fell roughly into two classes —the *de luxe* types, powered by engines of 140 h.p. or more, and the cheaper machines designed for ease of production and minimum operating costs.

Among the more interesting aircraft in the first category were the Nord 1101 and 1200, the SU C-10, SE.2100, SE.2310, SO.3050, Morane M-S 570 and the Max Holste MH.52. The four-seater Nord 1101 has a tricycle undercarriage and is powered with a 220 h.p. Renault engine. It has a wing span of 37ft 8in, and a cruising speed of 186 m.p.h.

Of more advanced design is the SUC-10, which is a pusher four-seater, powered by a 200 h.p. Mathis G-8R engine. It is a high-wing cabin aircraft with the tail unit carried on twin booms. The main dimensions and performance figures are: Span, 37ft 8in; unloaded weight, 1,631 lb; payload, 748 lb; all-up weight, 2,937 lb; max. speed, 161 m.p.h.; cruising speed, 143 m.p.h.; landing speed, 56 m.p.h.; range, 572 miles; and ceiling, 18,045ft.




### Tricycles

The Nord 1200 is a sort of scaled-down three-seat version of the Nord 1101 and is powered by a 140 h.p. Renault engine. It has an all-up weight of 1,925 lb and has a range of 515 miles at 143 m.p.h. Almost identical in size, the S.E.2300 has a fixed undercarriage and was designed for ease of production.

One of the neatest of all these light aircraft is the two-seater Max Holste M.H.52. This is a tricycle cabin low-wing monoplane generally similar to the G.A. Cygnet. Like most of the aircraft in this class it has a 140 h.p. Renault engine. It has a span of 32ft, an all-

# GOODYEAR LEADS

## with single disc brakes

**GOODYEAR'S** *new braking principle, incorporated in the Single Disc Brake, is the result of many years of research to develop a brake that will always operate at maximum efficiency. Every one of its features has been developed to give designers a brake that requires minimum service on the ground and will operate at maximum power whatever the aircraft's type or size.*

**SIMPLEST IN OPERATION :** large single steel disc rotates between two rugged brake shoes, mounted in unique clamp that applies smooth equalized pressure either hydraulically or mechanically.

**SIMPLEST IN CONSTRUCTION :** fewer parts than other brakes.

**COOLEST RUNNING :** brake disc is mounted flush with wheel rim, exposed to slip-stream, ensuring rapid heat dissipation and far longer brake-lining life.

**AUTOMATIC ADJUSTMENT :** wear in the lining is automatically taken up by an ingenious mechanism, giving uniform brake action at all times.

**LIGHTEST IN WEIGHT :** simple, compact assembly fitted within magnesium wheel, creating a low weight unit.

**NON-FADING ACTION :** cooler operation eliminates fading from overheating under emergency conditions.

**EASIEST TO SERVICE :** simple ; relining requires only a few minutes without special tools.

**NOTE TO DESIGNERS :**
Goodyear will give designers and engineers the fullest co-operation in all problems concerning wheels, brakes and tyres. Write to Goodyear, Aviation Products Department, Wolverhampton, England.

GOODYEAR

AVIATION PRODUCTS

# THE LONDON LINK TRAINER CENTRE

Excellent facilities for short periods of 'indoor flying' practice or instruction are now available at the Straight Aviation Training School, in Bush House. The most recent type of Link Trainer, under the supervision of qualified instructors, is at the disposal of all who wish to brush up their flying or supplement other forms of training. Both the experienced pilot who needs an occasional refresher flight or a 'blind flying' category and the raw beginner will find their needs met in the school's Link Training equipment for a very moderate fee.

# STRAIGHT AVIATION TRAINING LIMITED

**BUSH HOUSE · ALDWYCH · LONDON**

*Telephone: Temple Bar 6828*

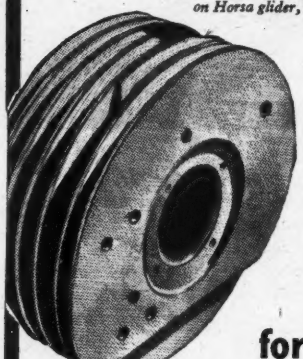
# Offkwik

PAINT REMOVER

**VULCAN PRODUCTS LTD**

**SLOUGH** *and 24 Ryder St. St. James. S.W.1. Abbey 4161 (5 lines)*

*Pulley wheel to carry control cables for rudder and ailerons on Horsa glider, machined from Bakelite Laminated.*



## BAKELITE

TREFOIL

REGD. TRADE MARKS

## LAMINATED

## for hard service

Bakelite Laminated combines lightness with remarkable toughness. It is resistant to water, heat, acid, chemicals, oils, abrasion . . . gives excellent electrical properties . . . and can be machined to fine limits. The tensile strength of one standard grade exceeds 18,000 lb. per sq. inch. Available in 40 different grades and a variety of forms including sheets up to 6 inches thick, rods, tubes and special shapes. Further information on request.

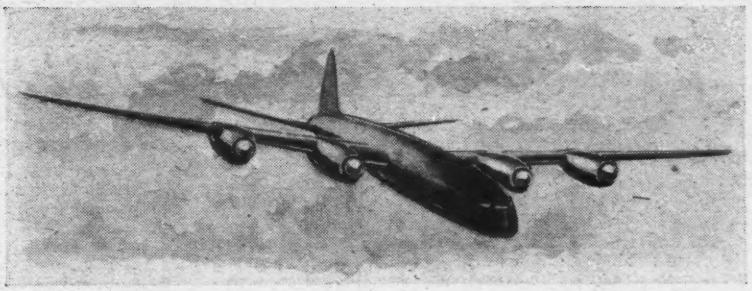
**BAKELITE LIMITED**

*Pioneers in the Plastics World*

18 GROSVENOR GARDENS · LONDON · S.W.1

T59

## CIVIL AIRCRAFT IN FRANCE



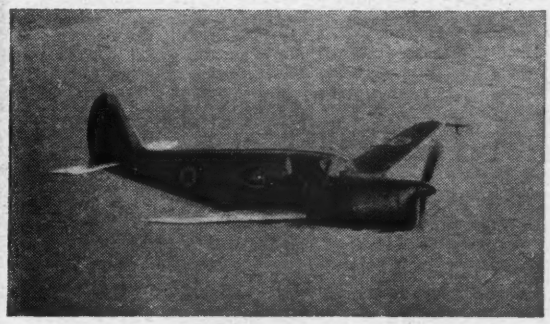
A high-altitude project to weigh between 25 and 35 tons, the S.E.1010 has a planned speed of 335 m.p.h. at 32,000ft, with four 1,340 h.p. Gnome-Rhone radials. The S.E.1010 is intended for several different duties both civil and military and these include photographic reconnaissance, and long-range mail service in addition to carriage of passengers and freight.

up weight of 1,914 lb, a maximum speed of 130 m.p.h., and a range of 621 miles.

The aircraft in the very light category looked rather primitive by comparison, but they are aimed at making flying cheap enough and safe enough for all and were, consequently, of more interest to the general public.

Taken as a whole, the French aircraft industry certainly seems to have made tremendous progress in the very short time since the liberation, especially as many of its former executives have been "removed" for collaboration with the enemy. Although few of the aircraft now being produced are exceptional, they are straightforward designs which show promise for the future.

In a short time Air France will have a fleet of aircraft suitable to compete on even terms on all routes with any other country. In addition to the older types still flying, which include the AAC-1 (an improved version of the Ju 52) and the Bloch 220, several Constellations, D.C.4s and D.C.3s will, it is expected, be taken over this year and, as already mentioned, Languedoc 161s are in production for the company and a few large six-engined flying boats (Latécoère 631 and S.E.200) are being built for long-range trans-ocean routes.



The Nord 1200 three-seater. This can be considered as a scaled-down version of the Nord 1101 and cruises at 143 m.p.h. The dihedral is certainly pronounced.

As new aircraft become available older ones are being withdrawn or employed exclusively for colonial freight work. Some thirty have been withdrawn since the nationalized company commenced operations.

Two entirely new types for which orders have been placed are the SO-30R illustrated on page 528 and of which it is said thirty are to be delivered, and the much larger S.E.2010. Landplane version of the S.E.200, the S.E.2010 is a 70-ton four-engined machine with tricycle undercarriage. The first example is now under construction. According to range and duty it will carry from 60 to 160 passengers for ranges varying from 650 to 2,500 miles. The cabin will be conditioned and pressurized to maintain 8,000 feet conditions at 20,000 feet, and it is intended that the furnishing and decorations shall compare favourably with any other aircraft on airline service. The passenger cabin will be some 72ft long by 15ft wide and the seats are to be in separate compartments each containing two banks of three seats facing each other.

One of the aims in building the S.E.2010 is to enable Air France to compete on world airlines with an entirely French product.

## VICKERS LTD.—CHAIRMAN'S SPEECH

MANY points of interest to the aircraft industry were contained in the speech by Mr. A. A. Jamieson, chairman of Vickers, Ltd., on the occasion of the company's 79th annual general meeting. After commenting on the changes necessitated by the untimely death of Sir Charles Craven he said that among the members of the board of directors appeared again the name of Sir John Anderson, while new appointments included Sir Thomas Merton and Major Kilner (managing director of the aircraft section of Vickers-Armstrongs, Ltd.).

Schemes for improvements and modernization which had already been authorized and some of which were under way, totalled £7,000,000. In addition it had been agreed to purchase the Brooklands properties.

The chairman said that three of the four shadow factories closed down during 1945 and output of aircraft had been reduced to about one-tenth of peak war production. In all 11,988 Spitfires, 8,946 Wellingtons and 569 Lancasters had been produced from the works under Vickers management.

### Weybridge

At Weybridge, the Viking was now in production for British European Airways and Transport Command, and orders had been received from India and the Argentine. The design of the Viking had been completed and three prototypes built in just over twelve months. The motor race track, airfield and buildings had been purchased from Brooklands (Weybridge), Ltd., in order to retain the buildings already in use and to acquire room for a new drawing office and new experimental equipment. The airfield, unsuitable for modern aircraft, would not be used as such Instead, the Government had granted the use of Wisley aerodrome which was adequate in size for all types under development or in the design stage. Orders to the value of £6,000,000 had been booked for commercial aircraft.

### New Works for Supermarine

At the end of 1940 the Supermarine works at Southampton had been heavily bombed and the main works damaged beyond repair. Negotiations were in progress for the purchase from the Government of the shadow aircraft works and aerodrome at South Marston, Swindon. Built in 1941, they were of modern construction and had been designed for production of fighter aircraft. The airfield was also a good one. The dispersed Supermarine units would eventually be concentrated here and the company was already concentrating on new designs for jet-propelled interceptor fighters and in attempting to solve problems introduced by the tremendous speeds which will be attained in the near future. Sir James Bird had retired during the year and his place as works manager of Supermarine had been taken by Mr. W. T. Elliott, O.B.E.

### Research Policy

Following concentration on war production, the company's policy was now full development of research facilities. Sir Thomas Merton, F.R.S., had been appointed to the board and he would guide the research programme. A separate aeronautical research section under the leadership of Mr. B. N. Wallis, F.R.S., had been formed and the most up-to-date equipment was being installed. In particular a special test chamber of 40,000 cubic feet capacity, superior to any existing or projected in the country, was being built. It would be possible to reduce the pressure in the chamber to a near vacuum and to alter the temperature from tropical conditions to minus 70 deg. C.

# CORRESPONDENCE

*The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.*

## "PATHFINDER STORY"

### *A Claim for No. 3 Group*

CONGRATULATIONS on a very fine article on P.F.F. and their technique. But just one point—Wing Commander Smith states that 5 Group deserve a special word of mention because of their precision attacks against small targets towards the end of the war.

I would like to point out that 3 Group were probably doing more precision blind bombing at the finish, using a form of radar known as G.H., and were marking targets for both night and day attacks with this device.

On many occasions they bombed above 10/10ths cloud with the front-line troops within 1,000 to 2,000 yds away, and although "Tommy" probably had one or two scares, there weren't many complaints.

Apart from this slight omission, congratulations again on a very good article.

"218."

## SERVICE PROMOTION

### *Technical N.C.O.s Who Lack Leadership*

OF late I have been hearing many complaints in the Services with regard to the new arrangements which, I understand, bring automatic increases in rank to those technicians who reach certain technical standards regardless of their ability to lead and command men.

Surely it is time, especially in the Air Force, where this evil is particularly prevalent owing to the great demand for high-quality technical work, that leadership was recognized as a positive and necessary qualification for those in authority over men, and that a special paid status should be given to those who are proved to possess it.

It seems to me that each N.C.O. should, if lacking this leadership status, hold authority only as regards the work for which he is qualified, and only over the men placed specifically under his command for that work.

This would circumvent the unfortunate possibility, mentioned by a Navy man in the papers recently, of a ship's boat in the last emergency being commanded by a radar technician without the remotest idea of leadership or boatwork.

Surely it is better that in such cases a rating qualified in the art of leadership should have control even if not the Senior Rating in the boat. Of course, all men should be given every opportunity to qualify in this manner if they are capable of doing so.

B. E. J. GARMESON.

## THE FAIREY F.C.1

### *A Promising Pre-war Design*

ON looking through a pre-war edition of the American magazine *Air Trails* I found a photograph, with a caption reading: "A model of the world's fastest and largest airliner, the British Fairey transport." I also read—in another edition—of a device fitted to this aircraft to make it a bi-plane when landing or taking-off.

Was this aircraft ever built? If so, what was its power plant, dimensions and performance? How many passengers did it carry? Are there any pictures or three-view plans of it available?

A mode of the Fairey F.C.1.

In the "Civil Aviation News" section of *Flight*, December 27th, 1945, there was an article about the Sydney, Rose Bay, flying-boat base. I certainly agree that the flying-boats should not be left in the open, but there is another side to the question.

This flying-boat base has long been a bone of contention, mostly because Rose Bay is not a suitable site for it. The flying-boats are exposed to the sometimes considerably rough water of Sydney Harbour, and when taking-off in one often-used direction the aircraft have to climb away over the steeply rising ground—which is thickly populated—behind the bay. Added to this is the hazard of taking-off in other directions amid the heavy ferry and small-craft traffic of the harbour.

However, this is all likely to be abolished soon, as £5,000,000 is to be spent on Mascot Airfield and a flying-boat base adjoining it on Botany Bay.

J. FREEBORN.

Sydney, N.S.W., Australia.

[The aircraft to which our correspondent refers was, in fact, never built. Work was proceeding on its development when war broke out in 1939. The Fairey F.C.1 was a four-engined pressurised transport with a tricycle undercarriage. It was intended to have a normal maximum range of 1,500 miles and a cruising speed, at 10,000 ft, of 220 m.p.h., while carrying 30 passengers. The only pictures available are those of the model, and, later, of the mock-up.—ED.]

## PICKING THE WAR-WINNER

### *Not in Alphabetical Order*

RE "Provocateur's" list of Allied aircraft. Here is mine:

1. Lancaster.—The best bomber of the war. 1942, 3, 4, and 5 proved its claim at night. 1944-5 proved its value as a day-light tactical bomber, i.e., Emmerich, Duren, etc. The "Queen of the Sky"—incidentally, the only multi capable of flying and maintaining height on one engine.

2. Mosquito.—The best "all-rounder" of the Allied team, also the most beautiful of the lot.

3. Wellington.—For first-line service throughout the war.

4. Spitfire.—The best fighter of the war—of course in its various marks.

5. Hurricane.—The Battle of Britain winner. A gallant and gentle old gentleman.

6. Anson.—Faithful Annie Anson. The origin of the R.A.F.'s supremacy in bomber ops. *The* trainer of the war.

7. Dakota.—For bringing up the rations.

If my list seems to leave the Americans in the cold, I must plead—please I'm "Bomber Command."

Incidentally thanks to Wing Cdr. M. A. Smith for his "Pathfinder Story"—at least I can tell my friends that navigation is not all astro and pinpoints.

PHILIP F. SIMPSON.

### *Must We Make Comparisons?*

"PROVOCATEUR'S" list of war-winners (*Flight*, May 2nd) has certainly aroused me! It seems that he has simply listed the aircraft most prominent in his mind, resulting in important omissions.

Another thing I notice is that his list apparently covers only operations in Europe. It must be rather disheartening to people who have spent most of the war years on mere trainers or Coastal Command types, for example, to find that people think that they did not really make such a big contribution to victory after all. It is very difficult to judge, even roughly, the part played by any particular type of aircraft, since there are so many factors to be considered. It might be argued that the Superfortress which dropped the first atom bomb did more to finish Japan than all the other aircraft in the Pacific put together.

To my mind, the first consideration to be made in picking war-winners is the purpose of any particular type. Which duty is more important—bombing, submarine hunting, defence fighting, escort fighting, transport, flying training, photo reconnaissance?

Personally, I prefer to give the job up and say that every air-

***The capital Sigma, in mathematics, is a symbol meaning 'the sum of'***

PHILIPS

***The Philips emblem, in everyday life is a symbol meaning the sum of expert design, skilled workmanship and good materials***

# PHILIPS

LAMPS · RADIO · X-RAY · COMMUNICATIONS EQUIPMENT
AND ALLIED ELECTRICAL PRODUCTS

PHILIPS LAMPS LIMITED · CENTURY HOUSE · SHAFTESBURY AVENUE · LONDON · W.C.2 (1270)

At Tollerton Airport, Nottingham, where complete F.C.A.S. Service is now available.

FIELD AIRCRAFT SERVICE

Croydon . . . . Hanworth . . . . Luton . . . . Nottingham

New and Used Aircraft
C. of A. Overhauls, Repairs, Modifications and Conversions
Maintenance and Service Contracts
Engine Repair and Replacement Service
Tool and Component Manufacture

FIELD CONSOLIDATED AIRCRAFT SERVICES LIMITED
(A.R.B. Approval A.I. 1074/38) Head Office : Great Woodcote House, Woodcote Drive, Purley, Surrey. Tel: Wallington 7001. Telegrams & Cables: Fieldair, Purley.

127.47

"LION" PACKING & JOINTING

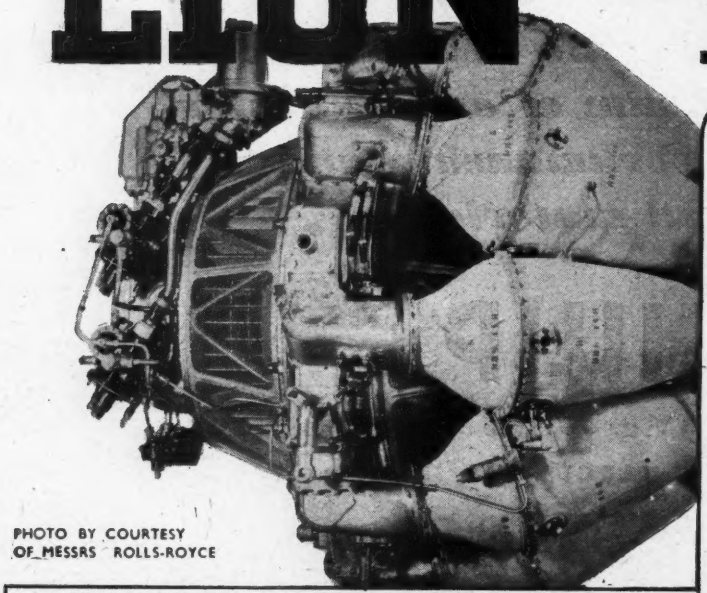


PHOTO BY COURTESY OF MESSRS ROLLS-ROYCE

WALKER'S LION PACKING

Where DEPENDABILITY is Vital

WALKER'S
"GRAFITOIL"
Compressed Asbestos Fibre
JOINTING
used on
ROLLS ROYCE "NENE" JET PROPULSION ENGINE

JAMES WALKER & CO. LTD., LION" WORKS, WOKING, Surrey
*Telephone:* WOKING 2432 (6 lines) *Telegrams:* "Lioncelle"
SPECIALISTS IN THE DESIGN AND MANUFACTURE OF AIRCRAFT PACKINGS AND JOINTINGS

# CORRESPONDENCE

craft type has done its fair share. If anybody *must* compare the efforts of various types, perhaps the best way would be to pick the most used. C. FRANCKSEN.

## PROVOCATIVE PUBLICITY

### *And a Technical Query*

MAY I be allowed to share the liberty of thought as expressed by your Correspondence columns in order to air a very real grievance and to make an enquiry?

I was almost annoyed by a recent advertisement which was gaily headed "Take your seats for Johannesburg." That is the one thing we can't do: you can do everything else, pay £167, get at least five documents completed and place yourself at the disposal of B.O.A.C. to leave at 12 hours' notice. But that is all, for you are then (presumably) on their "short list" and wait for months *unless* you have a priority. I could make many caustic remarks on this state of affairs, but will just say that "it ain't fair" and should cease immediately.

Now, I would be grateful if some enlightened soul could tell us the probable reason why the port outer props on the Northrop XB-35 are contra-3 bladers, and 4 bladers on the other three engines (confirmed by rear-view photo, *Time*, May 6th, p. 36).

"PERMITED TO LEAVE U.K."

## LONG-DISTANCE RECORDS

### *A Far-East Liberator Performance*

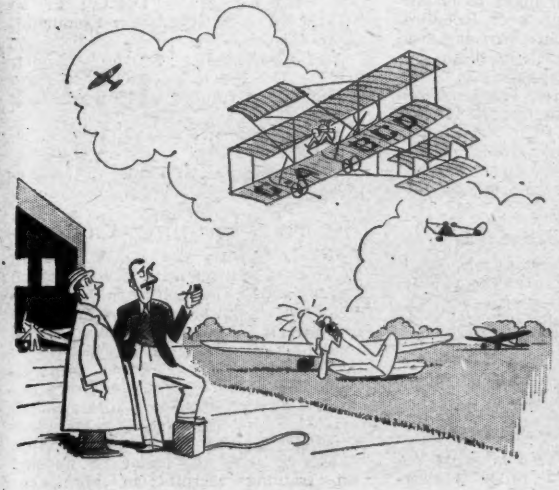
I HAVE just received some rather aged copies of *Flight* from home, and noticed in the Correspondence columns one or two letters about long-distance records. I used to be the Intelligence Officer of a Special Duty Squadron out here, and some of the figures which our Liberator flight knocked up may be of interest to you, although I am afraid that they may be rather old news by now.

Operating from Ceylon to Malaya, our Liberator flight of only ten aircraft managed to mount 44 sorties per month just prior to the end of the war, the *average* length of each sortie being 3,200 air miles. The longest sortie was one of 3,820 air miles, which was flown in 23hr 20min with an operational load of about 1,500lb (four containers in the bomb bay and some packages in the back which were pushed down a slide through the rear escape hatch). Incidentally, this particular aircraft returned to base with enough fuel left to have reached the 4,000-mile mark quite easily.

A.U.W. at take-off varied around the 62,000lb mark, although one of our Liberators scraped off from our Bengal base at 73,000lb from a 2,000yd runway!

As far as I know, these are records for the South-East Asia theatre, but it would be interesting to know whether anybody can beat them. B. GIBSON (Flt. Lt.).

Rawalpindi, India Command.



CRICHTON

"Yes that's Van Winkle, our oldest member, bit of a diehard."

## PRESSURE CABINS

### *Problem of Crew Visibility*

COMMENT has often been passed on the difficulties of providing pressurised aircraft with adequate crew visibility, and I believe that even on such carefully conceived aircraft as the Tudor and Constellation screen design is a poor compromise.

If adequate visibility is only required for take-off and landing, why is a special pilot's seat not installed in the very nose of the aircraft—outside the pressure cabin—for these operations? At low altitude there is no pressure differential and so no problem other than a small door in the cabin wall. For normal flight one small bug-eye could suffice for the duty pilot.

Extra weight would be small, or perhaps counterbalanced by structure weight savings, and when it would be required there would be adequate all-round vision. FUSILIER.

[Such an arrangement would be far more difficult to instal than "Fusilier" realizes. Control linkage would be particularly complicated.—ED.]

## MAN'S INGRATITUDE

### *"Pull Up the Ladder; I'm All Right!"*

FROM the Battle of Britain until VE-Day, there was nothing too good for any young man wearing the honoured uniform of the R.A.F. Civilians vied with each other to give him a good time when he was on leave, stage and screen stars rushed to entertain him, kissed him in their stage-door canteens, and "God-blessed" him on their radio programmes so fervently that one could imagine the crocodile tears coursing down the grease-paint. To every civilian he was one of "our *dear* boys."

Last Sunday I saw one, wearing an aircrew brevet, who had just missed a bus on a route where they only run about every 20min outside week-day rush-hours. A large saloon car rolled gently past and he "thumbed" it hopefully.

The fat, prosperous-looking driver and his fat, fur-coated companion saw the young airman right enough, but the big car rolled steadily on with its luxurious rear seat empty.

I caught the eye of a young mother wheeling her infant in his pram. She snorted contemptuously. "The war's over now and they feel safe again, so I suppose he can walk!" she said. MAN-IN-THE-STREET.

## REWARD FOR SERVICE

### *Pretty Speeches, Then Disillusion*

IT was with great pleasure I read the letter in *Flight*, April 18th, from "Wing Co., Rtd." I can endorse every word. Another aspect of the unfairness to ex-apps applies to the younger ones recently passed out from Halton. At the Jubilee celebrations and at each passing-out parade, many pretty speeches have been made about the "Halton Tradition," and the youngsters are ready to serve in the R.A.F. with the highest ideals and faith.

These boys are, without question, the cream of British youth. They have to be before being accepted as an entrant to Halton. But disillusion has come in a very short time. Promotion has passed them by in favour of part-time A.T.C. personnel and other war entrants, who cannot possibly have the same qualifications. It is a fact that many officers and N.C.O.s (war entrants) are "carried" by the ex-app. It seems to be the policy to promote conscripted men for propaganda purposes. However, this treatment is having a boomerang effect because these same disappointed ex-apps are being successful in discouraging the entry of many young aspirants to Halton and Cranwell. The answer, again, is to be found in "Pygmalion." P. B.

## FORTHCOMING EVENTS

May 24th.—Cambridge U.A.S. 21st Anniversary dinner, University Arms Hotel.

May 30th.—R.Ae.S. The 34th Wilbur Wright Lecture, by Mr. E. L. Relf (I.C.E, Gt., George St.).

June 1st.—R.Ae.S. Reading and Dist. Branch: Aeronautical Garden Party, Woodley.

June 15th.—Old Cranwellian Assoc. reunion, R.A.F. College

June 15th.—No. 150 Sqn. R.A.F. reunion dinner, Dorchester Hotel, 6.30 p.m.

June 22nd.—Air Pageant, Southampton Airport.

June 30th.—Northern Heights M.F.C. Gala day, Langley Airfield, Nr. Slough.

# SERVICE AVIATION

"Flight" photograph.

**HOVERFLY is the appropriate name given by the R.A.F. to the Sikorsky R-4 helicopter, several of which are used by the Helicopter School at Andover. In this picture, Mr. F. H. Dixon, of Fairey's, is seen trying his hand at this somewhat difficult branch of flying.**

## *Royal Air Force and Naval Air Arm News and Announcements*

### *R.A.F. in V-Parade*

#### *Commanders to Participate*

HIGH-RANKING officers of the R.A.F. will take part in the victory parade on June 8th. Each will travel in a Daimler scout car painted blue and bearing the R.A.F. crest. Driving two abreast, the cars will be preceded by 16 despatch riders.

The officers in the parade will be: Marshals of the Royal Air Force Lord Tedder and Sir Sholto Douglas, Air Chief Marshals Lord Dowding, Sir Arthur Longmore, Sir Philip Joubert, Sir Edgar Ludlow-Hewitt, Sir Arthur Barratt, Sir Guy Garrod, Sir John Slessor, Sir Roderic Hill, and Air Marshals Sir Arthur Coningham and Sir Robert Saundby.

Unfortunately, Marshal of the Royal Air Force Sir Arthur Harris and Air Chief Marshals Sir Frederick Bowhill and Sir Keith Park were forced to decline invitations to take part in the parade, due to their absence from this country.

#### *Mass Flight*

DURING the parade nearly 300 aircraft, drawn from 45 squadrons, will fly over London between Admiralty Arch and Buckingham Palace. Timed to take 20 minutes, the fly-past will begin at twelve noon. It is hoped that the whole flight will be led by a single Hurricane, piloted by an officer who took part in the Battle of Britain.

Practice for the flight began on May 15th, when a skeleton flight of 60 aircraft, after forming up over Romford, flew over the actual route, arriving dead on time. Mosquitoes led the flight, followed by a single Beaufighter X, Firebrands, Spitfires, Seafires, Tempests, and finally Meteors, of both the Mk III and Mk IV variety.

Senior officers of No. 11 Group, responsible for the control of the flight, watched the practice from the saluting base in the Mall.

#### *Halton to be Represented*

TWO Halton apprentice bands, totalling 107, will march in the parade, the pipe and fife band of No. 1 Wing, and the military band of No. 1 and No. 2 Wings. Also 750 specially selected apprentices will be stationed along the route to assist the police in controlling the crowds.

### *Appointments*

THE Air Ministry has announced the following Royal Air Force appointments:—

Air Vice-Marshal R. Graham, C.B., C.B.E., D.S.O., D.S.C., D.F.C., to be A.O.C. R.A.F. Mission to Australia and New Zealand, and R.A.F. Member of the Joint Chiefs of Staff, Australia.

Air Vice-Marshal H. S. P. Walmsley, C.B., C.B.E., M.C., D.F.C., to be A.O.C. No. 232 Group, Air Command, South East Asia.

Air Vice-Marshal S. E. Toomer, C.B.E., D.F.C., to be A.O.C. No. 219 Group, Mediterranean and Middle East Command.

Air Vice-Marshal P. E. Maitland, C.B., M.V.O., A.F.C., to be A.O.C. No. 84 Group, British Air Forces of Occupation (Germany).

### *Recruit Training Centres*

UNTIL recently the R.A.F. had 13 recruit centres with a total of 26 training wings at which recruits received their initial training. Accommodation for some of these recruit training wings was found towards the end of last year on airfields formerly held by the U.S. 8th Army Air Force. As a result of a reduction in the man-power allotment to the R.A.F. the number of recruit wings is being progressively reduced, and in conformity with the policy of housing and training recruits in permanent stations the ex-American airfields are being vacated first.

The centres at Rattlesden, Metfield,

Greenham Common and Kimbolton, consisting each of two wings, closed recently. The two-wing centre at Leiston will close at the end of this month, and it is expected that three other two-wing centres—Denethorpe, Melton Mowbray and Sudbury (Suffolk)—will close at the end of June or the beginning of July.

The permanent recruit centres will be: Wilmslow (three wings), Padgate (increased from two wings to three), Yatesbury and Compton Bassett (two wings), and Cardington (one wing). It is considered that these will be sufficient to accommodate the recruits entering the R.A.F. in the future.

## Roll of Honour

*Casualty Communiqué No.* 581.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of the names in this list, 238 are second entries giving later information of casualties published in earlier lists.

### Royal Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. J. M. Dixon.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. J. E. Ablett; Sgt. A. K. Beach; Sgt. D. W. Bishop; Flt. Sgt. B. V. Bowen; Sgt. H. C. Burnside; Sgt. E. H. A. Clift; F/O. J. Cockburn, D.F.M.; Sgt. D. A. Cotter; F/O. P. F. Croft; Flt. Sgt. J. M. Cruickshank; Sgt. C. W. Darkin; Sgt. C. G. N. Darlow; F/O. J. A. Dean; F/O. R. J. Deeble; Sgt. F. K. Derby; F/O. L. F. Edmonds; W/O. W. Entwistle; Flt. Sgt. W. J. J. Farbrace; Sgt. D. S. Farley; Sgt. E. R. Farley; Sgt. W. Forster; F/O. H. A. G. Gadd; P/O. T. A. Green; Sgt. T. Haddow; P/O. D. A. C. Hamilton; Sgt. R. F. Holland; Sgt. J. L. G. Huntley; Sgt. B. Jacques; Flt. Sgt. C. H. R. James; F/O. J. Johnson; P/O. W. T. Jones; F/O. L. A. Kessler; Sgt. G. E. Leadbetter; Sgt. J. Leonard; Sgt. S. E. Lockton; P/O. J. R. MacGregor; Flt. Sgt. A. McIvor; Flt. Lt. E. H. MacLellan; Sgt. L. Marfil; Flt. Sgt. J. A. Mathison; Sgt. J. Matthews; Sgt. N. Mitchell; Sgt. D. Morris; Flt. Sgt. R. R. C. Morris; W/O. T. T. Murdoch; Flt. Sgt. F. A. Murphy; W/O. V. J. O'Loughlin; Act. F/O. J. E. P. Oxborrow; Sgt. D. Penton; Sgt. S. Pick; Flt. Lt. M. S. F. Pritchard; Sgt. G. Rebecca; Flt Sgt. S. Robinson; F/O. G. F. Rose; Flt. Lt. P. C. W. Sage, D.F.C.; Sgt. G. Saville; Flt. Lt. J. E. Shannon, D.F.C.; P/O. G. Simpson; Sgt. E. W. Skipper; Sgt. J. Smith; Sgt. R. Stenhett; Flt. Lt. A. D. Stephen; P/O. J. H. Tales; Flt. Sgt. H. H. Taggart; Sgt. G. Tennison; F/O. J. H. Thorpe, D.F.C.; Sgt. E. C. M. Trott; Flt. Sgt. F. J. Turkentine; Sgt. D. R. Wellon; F/O. R. W. Woodrow; P/O. J. A. Wynn.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Sgt. W. Bean; F/O. K. R. Goldthorpe.

MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. W. J. H. Clarke; Flt. Sgt. J. H. Hamilton; Sgt. M. A. Hunt; F/O. W. G. H. Hunt; Flt. Sgt. K. E. Johnson; A/C. F. E. Tulley; Flt. Sgt. A. E. Bedwell; Flt. Lt. D. J. Cotter; F/O. J. E. J. Gillard; Flt. Sgt. J. H. Jones; W/O. E. Moore; Flt. Sgt. W. S. Paterson; Flt. Sgt. G. Smith; F/O. B. J. Thomas.

KILLED ON ACTIVE SERVICE.—F/O. H. T. W. Alderton; Act. Wing Cdr. J. Balshaw; F/O. B. Connor; Act. Sqn. Ldr. V. C. Ewens; F/O. J. D. Freckleton; Group Capt. J. M. Glaisher, D.F.C.; Flt. Lt. P. Green; Act. Flt. Lt. C. Harrison; W/O. J. H. F. James; Flt. Sgt. D. G. Nightall; Sqn. Ldr. R. C. Rivaz, D.F.C.; Act. Sqn. Ldr. W. J. Wyness.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Lt. M. A. Berkeley; Flt. Lt. J. G. Brown; Sgt. W. H. Parkin.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Lt. J. C. Cheetham.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. D. D. Foster-Stephens; F/O. S. L. Gildon; W/O. H. J. P. Hymas; Sgt. E. R. E. Lloyd; Wing Cdr. D. G. Simmons.

DIED ON ACTIVE SERVICE.—Sgt. D. A. Aloof; L.A/C. B. L. Bailey; Cpl. R. H. Bailey; Flt. Sgt. A. W. H. Ballard; W/O. W. G. Banham; L.A/C. A. Bell; A/C.2 G. A. Bell; Flt. Lt. S. Bendixon; A/C.1 H. H. Blair; A/C.1 F. M. Brain; Sgt. C. J. Brown; Act. Flt. Lt. P. G. Cadle; L.A/C. J. Campbell; A/C.1 W. S. Capon; A/C.1 E. C. Cave; L.A/C. F. Caygill; A/C.1 E. F. Chadburn; A/C.2 D. G. Clarke; L.A/C. W. C. Corlett; Cpl. L. Corner; A/C.2 C. Davis; Cpl. J. A. Durham; Sgt. R. C. Farmer; A/C.2 S. F. J. Field; A/C.1 J. Fletcher; A/C.1 J. H. Garner; L.A/C. R. Goddard; A/C.2 A. Greenfield; W/O. L. C. Gumbleton; A/C.1 J. D. Hall; Sgt. C. F. Hart; L.A/C. J. Hatton; L.A/C. E. Haynes; L.A/C. E. W. Heather; A/C.1 L. W. Hill; Act. Cpl. W. R. Hill; A/C.1 S. G. Hobson; Cpl. J. V. Holdsworth; Cpl. C. G. Holmes; A/C.1 J. A. Jacklin; A/C.1 W. G. Johnstone; A/C.1 A. D. Jones; L.A/C. R. L. T. Joy; Cpl. J. G Kane; A/C1 R. Kay; L.A/C. C. H. Ladd; L.A/C. A. C. Lewis; L.A/C. L. Lewis; Sgt. J. H. Lock; L.A/C. T. W. McGuire; L.A/C. J. B. McLeod; L.A/C. R. W. Maycock; Sgt. J. W. Miller; A/C.1 G. S. Morton; A/C.1 C. J. Mossman; A/C.2 E. A. Palmer; L.A/C. G. W. Parrott; A/C.2 D. Phillips; Cpl. A. F. Rendell; A/C.2 T. J. Roberts; L.A/C. S. F. Roe; A/C.1 R. Sanderson; A/C.2 J. Sargeant; W/O. V. J. Saunders; Cpl. N. A. Seymour; Cpl. D. C. Soutar; L.A/C. W. P. Smith; L.A/C. E. N. Spuffard; A/C.1 D. W. Stent; A/C.2 J. Stevenson; A/C.2 P. R. Suter; L.A/C. S. T. Thompson; L.A/C. R. E. G. Tout; W/O. W. P. Tugwell; A/C.1 T. D. Turner; L.A/C. R. Watson; A/C.1 V. Wilde; A/C.1 G. A. Williams; A/C.1 V. Willis; L.A/C. E. Winstanley; L.A/C. S. J. Winton; Cpl. J. T. Wright.

### Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—Cpl. E. M. Masters.

## SERVICE AVIATION

**Badge of Fighter Command Communications Squadron, R.A.F.—"Everywhere."**

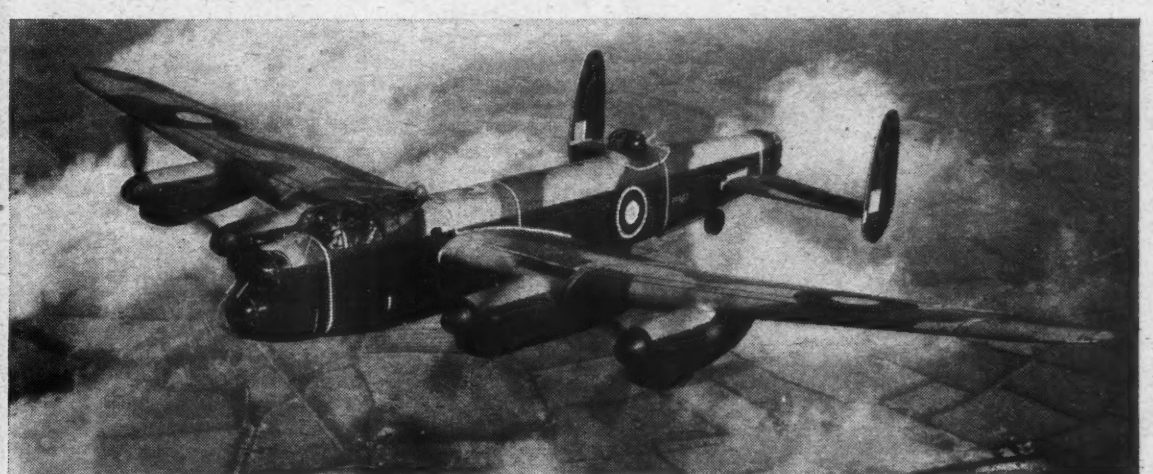
### Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. N. D. Harrison; F/O. R. C. O'Neill; P/O. A. H. Clarke; P/O. L. H. E. Fairhead; F/O. K. R. Holland, D.F.C.; W/O. H. S. Jordan; P/O S. Keen; F/O. D. N. Kehoe; Act. Flt. Lt. K. M. D. Lyons, D.F.M.; Act. F/O. M. J. Roe; Flt. Sgt. T. R. Ryan; Flt. Sgt. W. O. Shaw; P/O S. R. Stead; W/O. J. D. Stevenson; W/O. P. Sturges; P/O. K. G. Tennant; Act. Flt. Lt. A. B. L. Tottenham, D.F.C.

### Royal Canadian Air Force

PREVIOUSLY REPORTED MISSING BELIEVED KILLED IN ACTION NOW PRESUMED KILLED IN ACTION.—F/O. R. J. Webb.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. R. F. Adam; Sgt. W. B. Allan; Flt. Sgt. E. R. Alm; F/O. J. Armitt; F/O. O. W. Armstrong; P/O. H. J. Arnold; F/O. N. G. Baily; P/O. H. L. Ball; F/O G. M. B. Barlow; F/O. D. W. Bateman; F/O. D. A. Bayley; Flt. Sgt. L. H. Beaumont; F/O. A. J. Beck; Flt. Lt. I. B. Benson; Flt. Lt. D. E. Berry, A.F.C.; P/O. F. D. Billingsley; Flt. Lt. N. F. Blain; P/O. F. W. Bradley; Flt. Lt. L. W. Brand; F/O. E. J. Brown; P/O. R. C. Brown; Flt. Sgt. J. A. Bruggeman; F/O. R. J. Calford; Flt. Sgt. D. F. Campbell; Sgt. V. D. Campbell; F/O. N. D. Cochrane; Flt. Sgt. C. E. L. Cook; Flt. Sgt. W. R. Cookson; P/O. C. C. B. Craigie; Flt. Sgt. B. R. Cunliffe; Flt. Sgt. G. R. A. D'Amour; Flt. Sgt. J. B. Davey; F/O. H. D. Davy; W/O. F. S. Dennis; P/O. J. F. Devitt; Flt. Sgt. E. C. Dufresne; F/O. E. Essenberg; W/O. W. R. Fields; F/O. J. B. Fitzgerald; F/O. V. B. Fleming; P/O. M. A. G. Fournier; Flt. Lt. W. L. Friker; W/O. R. E. Fulcher; W/O. J. Gallagher; Flt. Lt. T. E. Gallivan; P/O. V. C. Gerrie; F/O. W. R. Gibbs; F/O. W. J. Gilmore; F/O. F. M. Gordon; Sgt. B. Granka; F/O. M. C. Grant; Flt. Sgt. M. Greenstein; F/O. L. I. Guthrie; Flt. Sgt. S. S. Hagerty; P/O. A. W. Haley; F/O. G. L. Halsall; W/O. L. A. S. Hambrooke; Flt. Sgt. H. R. Hammerton; Flt. Sgt. O Harding; Sgt. T. R. Harrigan; Flt. Sgt. F. Henry; F/O. G. A. Hoggard; W/O. M. H. Horne; Flt. Sgt. B. E. House; Flt. Sgt. D. W. Johnson; F/O. C. L. Johnston; F/O. J. H. Johnston; F/O. D. G. Kellar; P/O. J. W. Kopp; P/O. J. R. Kubin; Flt. Sgt J. Y. J. C. Lamaire; F/O. L. E. Long; F/O. R. J. Lougheed; Flt. Sgt. T. J. McAran; P/O. W. J. McArthur; Flt. Sgt. D. J. McAulay; F/O. G. T. McCauley; Flt. Sgt. E. J. McClarty; F/O J. J. McElhone; P/O. D. J. MacFarlane; F/O. D. A. Magrath; F/O. D. G. McKay; F/O. W. E. McLean; Flt. Sgt. A. J. McLeod; Flt. Sgt J. J. McNeil; F/O. L. H. Mahler; F/O. W. B. Mallen; F/O. W. F. Maloney; P/O. E. K. Mainprize; Flt. Sgt. A. A. Margolis; F/O. L. Medynski; P/O. W. G. Mendenhall; F/O. G. A. Mortimer; P/O. J. C. Mortley; Flt. Sgt. J. F. E. Moyle; Flt. Sgt. T. F. Murphy; F/O. P. R. Myrick; P/O. E. E. Newell; F/O. J. A. O"Brien; F/O. T. J. O' Neill; Flt. Sgt. F. H. Paterson; Flt. Lt. H. L. Payne; P/O. J. A Perdue; F/O. J. M. Phillips; P/O. W. J. Phillips; F/O. P. Pokryfka; F/O. R W. A. Rankin; Flt. Sgt. J. C. Rhind; Flt. Sgt. G. E. Robertson; Flt. Sgt. D. G. Russell; Flt. Sgt. J. B. Rynski; W/O. B. T. Sheeran; Flt. Lt. J. W. Slater; F/O. C. Smerneos; Flt. Sgt. N. L. I. Smith; F/O. R. B. Smith; F/O R. S. Stanzel;



**A WAR WINNER COMES TO TOWN: In the Victory flight over London on June 8th, Lancasters will represent the heavies of Bomber Command.**

P/O. A. L. J. St. Pierre; W/O. R. R. Stuart; Flt. Lt. B. P. Swingler; P/O. H. C. Tarzwell; F/O. J. Tite; Flt. Sgt. D. C. Tonkin; P/O. L. P. Wakely; Flt. Lt. C. A. Walker; W/O. W. C. Whitney; F/O. F. H. Wilsher.

MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Lt. E. J. McAlpine; Flt. Lt. A. E. McMurran; Flt. Lt. B. A. Williamson.

KILLED ON ACTIVE SERVICE.—Flt. Lt. K. J. Blevins; Flt. Lt. W. E. Hopkins.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—F/O. D. L. Dewart; F/O. W. M. Howard; Sgt. G. D. O'Connor; F/O. D. A. Spice; Sgt. E. A. Wilson.

MISSING BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sqn. Ldr. G. H. Finch, D.F.C.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—F/O. R. R. Harrison; F/O. E. H. Neufield.

DIED ON ACTIVE SERVICE.—L. A/C. A. Savoie.

## *Royal New Zealand Air Force*

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Act. F/O. J. R. Copland; F/O. K. W. Jones; P/O. M. Lambert; Flt. Sgt. G. E. Longley; W/O. A. J. Phillips; F/O. D. A. Sandman; F/O. H. M. Sheed; W/O. S. C. Shutt; Act. Flt. Lt. J. Ward; F/O. L. T. Whitaker.

## *South African Air Force*

DIED ON ACTIVE SERVICE.—Air Mech. W. T. Bailey; Lt. R. H. Palson.

### *Casualty Communique No. 582.*

Of the names in this list 255 are second entries giving later information of casualties published in earlier lists

## *Royal Air Force*

MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. A. Thorp.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. R. Glen.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. G. Adams; Sgt. R. S. Alderson; Sgt. T. Allanson; Sgt. N. Amos; W/O. C. A. Anderson; P/O. G. Ansell; F/O. H. R. Arbon; P/O. R. W. Ashman; Flt. Sgt. E. D. Atkinson; Sgt. R. M. Badger; F/O. D. Baker; Flt. Sgt. R. C. Bartlett; Flt. Sgt. C. E. Bayliss; Sgt. D. G. Bayliss; F/O. W. R. Beechey; Sgt. A. G. Beesley; F/O. J. R. Bell; Sgt. P. E. Bell; Flt. Lt. E. Bennett; P/O. L. W. Bennett; Sgt. W. J. Bingham; F/O. G. E. Blandford; W/O. R. C. Bolland; Sgt. R. S. R. Booker; Flt. Sgt. N. R. Booth; F/O. H. S. Bowles; Act. Flt. Lt. J. Boyle; Flt. Sgt. R. F. J. Bright; Flt. Lt. A. R. Brown; F/O. D. Brown; F/O. G. A. Brown; Sgt. R. Brown; Flt. Sgt. K. F. Bull; Sgt. R. O. Bundy; Sgt. A. Burgess; Flt. Sgt. E. C. Care; Flt. Lt. R. F. Cass; Flt. Lt. H. W. Castle; Sgt. C. L. Caston; Sgt. D. Chapman; Flt. Lt. J. C. Chesters, D.F.M.; F/O. D. J. Christensen; F/O. P. C. Clapham; P/O. J. A. C. Clarke; Flt. Sgt. F. L. J. Colbourn; Sgt. D. O. G. Coote; Flt. Sgt. P. F. J. Copp; F/O. A. Cox; Flt. Lt. F. N. Crane; Sgt. G. Creaser; Sgt. J. A. Crisp; Sgt. J. H. Crooks; P/O. F. W. Cuer; W/O. C. N. V. Davey; P/O. W. C. Davidson; Sgt. L. Davies; Sgt. D. F. G. Day; F/O. R. G. Devine; Sgt. A. A. Dowling; F/O. R. S. Driscoll; Sgt. R. I. P. Eckford; Flt. Lt. J. G. Enticott; Sgt. T. W. Farmer; Sgt. J. A. Fenton; Flt. Sgt. A. McG. Findlay; Sgt. K. J. Fletcher; Sgt. P. S. Foster; P/O. N. I. Freakley; Sgt. C. R. Freeman; Flt. Sgt. W. R. Garrison; Sgt. D. R. Gillfillan; Sgt. R. H. Ginn; Flt. Lt. W. Goddard; Act. F/O. R. Gordon; F/O. P. I. Green; Sgt. J. D. Griffin; Flt. Sgt. A. F. Grimwood; Sgt. D. Gutteridge; Sgt. W. E. Guy; Sgt. D. W. Hale; Sgt. R. Hamilton; Sgt. G. E. Hamoniaux; Flt. Sgt. J. Harding; P/O. W. R. Harding; P/O. J. C. Harris; Sgt. L. Harris; Sgt. W. T. Hartland; Sgt. R. G. Hawkes; F/O. F. J. Hegan; Sgt. D. Hill; Sgt. D. A. Hinchcliffe; Sgt. S. Hoggett; Flt. Sgt. T. Horrocks; Flt. Sgt. A. Hoy; Flt. Sgt. T. E. Hughes; Sgt. J. Hutchinson; Sgt. R. V. Ind; Flt. Sgt. D. J. Ives; F/O. J. M. S. Jackson; Flt. Sgt. C. G. Jerram; Sgt. D. J. Job; Sgt. C. Johnson; Sgt. F. C. Jones; Flt. Sgt. J. R. Jones; Flt. Sgt. R. H. O. Jones; Sgt. H. V. Keeling; P/O. H. J. Keenan; Sgt. E. G. Kelly; Sgt. L. Kendrew; Flt. Sgt. E. J. Kiely; Flt. Sgt. J. Kilpatrick; Sgt. R. J. Knight; F/O. C. E. Laishley; P/O. J. J. Lane; Sgt. W. J. Lawn; Sgt. T. Leveritt; Flt. Sgt. A. W. Levick; Sgt. G. A. Levings; F/O. L. E. Light; Sgt. W. Lightowler; F/O. A. Linton; F/O. J. S. E. Locock; Flt. Lt. M. S. Lumsden; Flt. Sgt. D. Lunn; Flt. Sgt. D. McCann; Act. F/O. L. J. T. McCarthy; Flt. Sgt. A. M. B. McDonald; P/O. B. McGarrity; Sgt. R. McKeen; F/O. J. P. Manser; Act. Flt. Lt. J. H. Marsh; Flt. Sgt. K. Martin; Sgt. J. F. Maxwell; Flt. Lt. J. G. P. Maxwell; P/O. J. Miles; Sgt. J. C. Millar; Sgt. J. B. Mitchell; Sgt. G. W. Moore; Flt. Sgt. V. C. Morgan; Sgt. J. Munday; Flt. Lt. G. D. T. Nairn; Sgt. G. Nixon; Sgt. R. L. Nutbrown; F/O. T. Oaler; Flt. Lt. K. J. Panment; Sgt. R. Patterson; Flt. Sgt. F. D. T. Phillips; Sgt. H. R. Piper; Flt. Sgt. H. C. Pollard; Sgt. G. S. Priddin; Sgt. D. W. G. Purse; F/O. G. N. Reay; F/O. J. Redmond; Sgt. R. Redmond; Sgt. A. Reid; F/O. E. H. Rhodes; Flt. Sgt. J. C. Richardson; Sgt. J. A. Rix; Sgt. A. Rollinson; Act. Flt. Lt. L. Roberts, D.F.C.; Flt. Sgt J. D. Robertson; Sgt. G. D. Rowden; Sgt. H. Roxby; Flt. Sgt. I. B. Runciman; Sgt. G. M. Sampson; Sgt. J. G. D. Sanders; Sgt. H. Sapsed; Sgt. K. Sawkins; Sgt. A. Scammell; Act. Sqn. Ldr. R. H. Schofield; Sgt. J. D. Shilcock; Sgt. E. G. Simmonds; F/O. M. Sims; Flt. Sgt. E. J. Simfield; Act. Flt. Lt. C. W. Slatter; F/O. E. A. Slogrove; Sgt. H. J. Smalley; Sgt. F. Smith; P/O. J. D. Smith; Sgt. R. C. Starkey; F/O. J. A. S. Stewart; Flt. Sgt. G. W. Stott; W/O. C. E. Stratford; Sgt. V. Stringer; Sgt. E. C. M. Swart; Flt. Lt. F. Taylor; Flt. Sgt. J. M. Taylor; Sgt. W. J. E. Templeman; W/O. D. Thompson, D.F.C.; Sgt. D. B. Thomson; Sgt. R. G. Tucker; F/O. J. J. Walsh; Sgt. C. S. Webb; Sgt. C. F. Whitefield; Flt. Lt. K. W. Whitefield; P/O. W. J. R. Williams; F/O. J. R. Wilson; Flt. Sgt. W. Wilson; Sgt. E. F. Wood; Sgt. E. J. Wright; Flt. Sgt. G. H. Wright; Flt. Sgt. E. C. Berg; W/O. T. F. Higgs; F/O. R. E. H. Medhurst; Flt. Lt. J. B. J. Smith; F/O. A. D. Turner; Flt. Lt. H. V. Alexander; Sqn. Ldr. W. M. Barry; Sgt. A. C. Bennett; Sgt. D. C. Bird; Wing Cdr. J. H. B. Blake; Sqn. Ldr. B. A. Bullman, M.B.E.; Flt. Sgt. D. T. Burrell; Flt. Lt. W. P. Clifford; Sgt. T. D. Crompton; P/O. F. C. Dyer; W/O. N. C. Harris; L.A/C. G. Hodgett; A/C.1 W. J. Jackson; Act. Sqn. Ldr. A. Jacques, D.F.C.; Group Capt. J. R. Jeudwine, D.S.O., D.F.C., O.B.E.; Act. Flt. Lt. W. H. Gibbs; Act. Sqn. Ldr. W. A. Hawkes; Flt. Sgt. B. Hobbs; F/O. B. Nielson; W/O. R. Owen; Flt. Sgt. B. J. Phillips; Flt. Sgt. L. J. Pittock; Cpl. S. Robinson; Flt. Lt. E. J. Savill, D.F.C.; Flt. Lt. D. J. Sclater; Sqn. Ldr. R. A. Steele; Flt. Lt. W. Talbot, D.F.C.; L.A/C. G. Wilkinson.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. G. D. Clarke; W/O. T. G. H. Cox; F't. Sgt D. M. Davies; Flt. Sgt. C. A. Green; Flt. Sgt. F. Hawthorne; Flt. Lt. H. R. S. Levy; Flt. Sgt. J. J. Reilly; W/O. J. N. Sparkes.

MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. W. S. Barnes; W/O. H. G. Budd; W/O. N. F. Finch; Cpl. R. A. Pearce.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. N. Wagstaffe.

WOUNDED OR INJURED ON ACTIVE SERVICE.—W/O. W. H. Allchin; F/O. E. Hooper; Flt. Sgt. H. E. H. Wood.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—A/C.1 K. J. Fairbrass; Cpl. W. Kelly; Sgt. F. E. Mooret.

DIED ON ACTIVE SERVICE.—Cpl. V. F. Beavis; F/O. H. H. Bradley; Sgt. J. Buck; Act. Flt. Lt. Sir S. J. Bull; L.A/C. F. S. Campling; A/C.2 R. B. Clavery; A/C.1 L. A. Clayton; P/O. E. A. Coombes; A/C.1 R. T. Davey; L.A/C. F. Davidson; Cpl. H. Dixon; L.A/C. J. B. Duncan; L.A/C. J. T. Dyson; Cpl. H. Farish; Act. Wing Cdr. H. J. Fish; W/O. J. J. Fox; L.A/C. C. Giffard; L.A/C. R. G. Glaze; A/C.1 G. L. H. Gosling; A/C.1 I. Griffiths; L.A/C. R. H. Haire; A/C.1 P. H. Hayes; L.A/C. G. L. Hayward; L.A/C. A. E. Hornsby; Sgt. R. C. Hughes; W/O. A. D. Jack; L.A/C. J. Jamieson; Cpl. K. J. M. Kemmler; Cpl. R. Lawson; Cpl. C. K. Leak; Cpl. F. D. Lloyd; Cpl. D. V. Martin; A/C.1 W. S. Matheson; L.A/C. W. H. Mead; A/C.1 D. Moore; L.A/C. K. Morrison; A/C.1 W. Mort; A/C.2 F. R. Newman; L.A/C. A. J. H. O'Keeffe; A/C.1 T. Orange; A/C.2 W. J. Pepper; Flt. Lt. T. C. Rawlinson; L.A/C. J. E. Root; A/C.2 F. R. Scotcher; A/C. B. Scott; Cpl. T. Semple; Sgt. A. W. Smith; A/C.1 W. C. Wise.

**Badge of the R.A.F. Intelligence School — "Præmonitus præmunitus" (Forewarned is Forearmed).**

## *Women's Auxiliary Air Force*

DIED ON ACTIVE SERVICE.—L.A/CW. H. M. Skeates.

## *Royal Australian Air Force*

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. M. J. McLeod.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—P/O. R. G. Crisford; Flt. Sgt. B. M. Trowbridge.

## *Royal Canadian Air Force*

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. T. C. Gamey.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. N. P. H. Anderson; P/O. J. G. R. Buchanan; Flt. Sgt. T. A. Casey; P/O. L. A. Chadwick; P/O. R. C. Conley; Flt. Sgt. J. C. Cooke, C.G.M.; W/O. J. J. Corman; Sgt. J. Feldman; Flt. Sgt. H. Gillender; P/O. R. S. Goddard; Flt. Sgt. J. A. Goff; P/O. K. M. Hammond; Flt. Sgt. W. H. Hanes; W/O. F. I. R. B. Hill; F/O. R. A. Hiltz; F/O. L. J. Hopper; F/O. J. A. G. Julien; Flt. Sgt. D. E. Le Liever; P/O. J. A. McLea; P/O. J. H. C. McCoubrey; Flt. Lt. M. R. McQuillan; F/O. R. A. McVicar; P/O. T. J. Maloney; Flt. Sgt. W. G. E. Morgan; W/O. F. E. Newman; Flt. Lt. C. J. Ordin; F/O. J. O. Peltier; F/O. R. E. B. Pike; P/O. C. T. Rielly; Flt. Sgt. J. L. Rochester; Flt. Sgt. J. E. Sabine; W/O. M. M. Sandomirsky; F/O. V. A. Sorrenti; P/O. J. W. Vandenbergh.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—F/O. F. J. Klapkew; Flt. Lt. G. I. Sheldrick.

KILLED ON ACTIVE SERVICE.—F/O. G. A. McIntyre; F/O. F. H. Seaman; F/O. E. J. Shaw.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—F/O. J. N. O'Donnell.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Flt. Sgt. A. E. MacKenzie; L.A/C. C. C. Menard.

## *Royal New Zealand Air Force*

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Lt. S. S. Williams.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. T. I. Elliott; Act. Flt. Lt. L. A. Martyn; Flt. Lt. R. M. Singer.

## *South African Air Force*

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Lt. P. J. Mockford; Lt. V. W. Westlake.

**TROOP CARRIER: The capacious fuselage of the new Handley Page Hastings Service transport. The large door appears especially suitable for loading military vehicles and guns.**

a Morrex Brush for every part
MORREX Industrial Wire Brushes are very extensively used in the Aircraft Industry for imparting a finish to aero engine components, and for metal cleaning, fettling castings and decarbonising. A wide range of brushes is available, including Refill Sections, Circular brushes, Cylinder Head brushes, Expanded Valve Seat brushes, and Splayed Cup brushes for heavy cleaning.
The wire used is made from a high grade steel specially treated to ensure a uniformly sharp abrasive surface.
COMPLETE LIST WILL BE SENT ON REQUEST.
MORREX
INDUSTRIAL
Wire & Fibre Brushes
Produced by the manufacturers of MORRISFLEX FLEXIBLE SHAFT EQUIPMENT
TELEPHONE: SHIRLEY 1237 B.O. MORRIS LTD, SHIRLEY, BIRMINGHAM TELEGRAMS: MORRISFLEX BIRMINGHAM

ENQUIRIES INVITED

# SELF-ADHESIVE TAPE

After completing Government and Export business, a proportion of our capacity is available for home trade purposes.

## SAMUEL JONES & CO. LTD

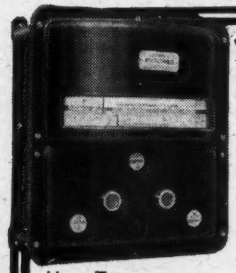
16-17 NEW BRIDGE STREET, E.C.4. PHONE: CENTRAL 6500

# B★E★F

WINDSHIELDS of WORCESTER

*Now* happily, it is goods instead of men that are going overseas as our B.E.F. So that for the time being we must, most reluctantly, say to all at home—B.E.F.—"British Exports First"

SOON OUR LATEST DEVELOPMENTS WILL BE ON EVERY SHIP, PLANE, CAR AND RAIL COACH EVERYWHERE—HOME & ABROAD



*Pyroreg*

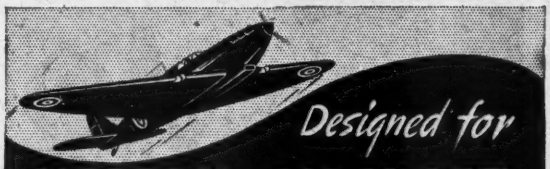
AUTOMATIC TEMPERATURE CONTROLLER

★ Also Recorders and/or Indicators for Salt Bath and all other Heat Treatments to conform with A.I.D. requirements

**BOWEN INSTRUMENT CO. LTD.**

9/13, NEWTON ROAD, LEEDS, 7.

Telephone: 41036-7.



*Designed for*

MODERN AIRCRAFT

BECLAWAT

FIXED OR DIRECT VISION PANELS OF ANY TYPE, AND COMPLETE HOODINGS

BECKETT, LAYCOCK & WATKINSON LTD., Acton Lane, London, N.W.10.

'Phone: ELGAR 5403-4-5. 'Grams: Beclawat, Phone, London.

# EVERYTHING IN SHEET METAL

## AND LIGHT ENGINEERING

Aircraft
Automobile
Refrigeration
Cold Storage
Heating
Drying
Mining
Air Conditioning
Coach & Bus Building
Municipal Vehicle Bodies
All-metal Vehicle Bodies of all Types

TELEGRAMS:
BROMELPAR, SOUTHTOT
LONDON

**E. G. Brown & Co. Ltd**

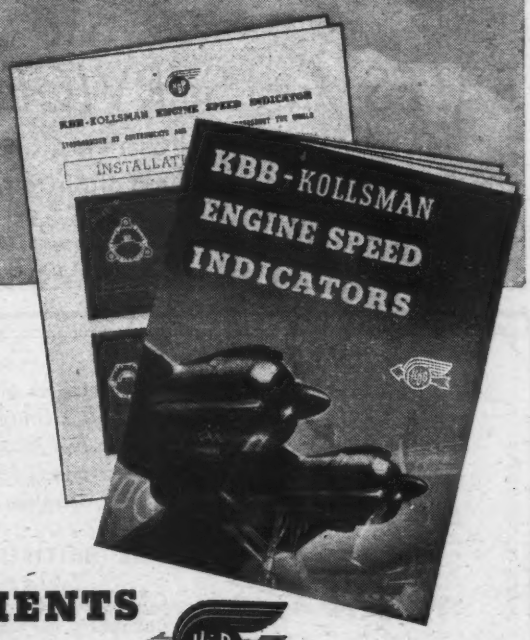
TELEPHONES:
TOTTENHAM
2257, 2258 & 2259

**161, West Rd., TOTTENHAM** **LONDON, N.17**

*Have you had this series of—*

**AIRCRAFT INSTRUMENT FOLDERS?**

In addition to our well known Maintenance Manuals we have published from time to time descriptive folders in colour containing useful filing material on Kelvin aircraft instruments and testing apparatus. Separate installation leaflets are also available.




*Write for any of the following which interest you—*

K.B.B.-Kollsman Simple Altimeters, K.B.B.-Kollsman Sensitive Altimeters, K.B.B.-Kollsman Rate of Climb Indicators, K.B.B. Airspeed Indicators, K.B.B.-Kollsman Engine Speed Indicators, Kelvin Sensitive Air Pressure Gauge, Kelvin Aircraft Instrument Testing Apparatus, K.B.B. Vibrograph, Kelvin Sensitive Aircraft Barometer.

**KELVIN AIRCRAFT INSTRUMENTS**

proven in reliability—ahead in design

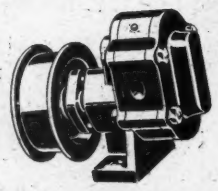
KBB

KELVIN BOTTOMLEY AND BAIRD LIMITED • BASINGSTOKE

BROOKE TOOL
CARDINAL

SUDS PUMPS

gear type, for supplying coolant to machine tools. Also used for pumping tar, heavy oil, and other viscous fluids.
Manufactured by BROOKE TOOL, makers of a wide range of Engineers' Quality Small Tools.
Tel.: VIC. 2323
'Grams.: Saws, Birmingham



BROOKE TOOL MFG. CO. LTD. GREET BIRMINGHAM

PREVENTION OF CORROSION

Metal Spraying
BY THE WIRE PROCESS

Metallisation LIMITED

PEAR TREE LANE
DUDLEY. Phone 2523

The original and largest Metal Spraying Plant in Great Britain, offers you Technical Advice and assistance to overcome your problems of corrosion. Descriptive Literature on the Wire Process on application.

BUILDING UP OF WORN PARTS

M-W.57

Air Facts LTD
SALES AND SERVICE
Aeroplanes for Special Charter.
C. of A's. undertaken for any type of Aircraft.
AIRCRAFT STORES & MAINTENANCE SECTION. Uplands 8778
MAIN HALL, CROYDON AIRPORT. Croydon 7744. Extension 249
AIRPORT, MANCHESTER - - - - Eccles 1720

THE LONDON AEROPLANE CLUB
ANNOUNCE
A REDUCTION IN FLYING CHARGES
TO
£3 : 10s. PER HOUR
DUAL OR SOLO
in Tiger Moth and Hornet Moth aircraft
PANSHANGER AERODROME
Near HERTFORD
Restaurant and Bar Telephone : Essendon 305

If it's AVIATION INSURANCE consult B. A. I. C.

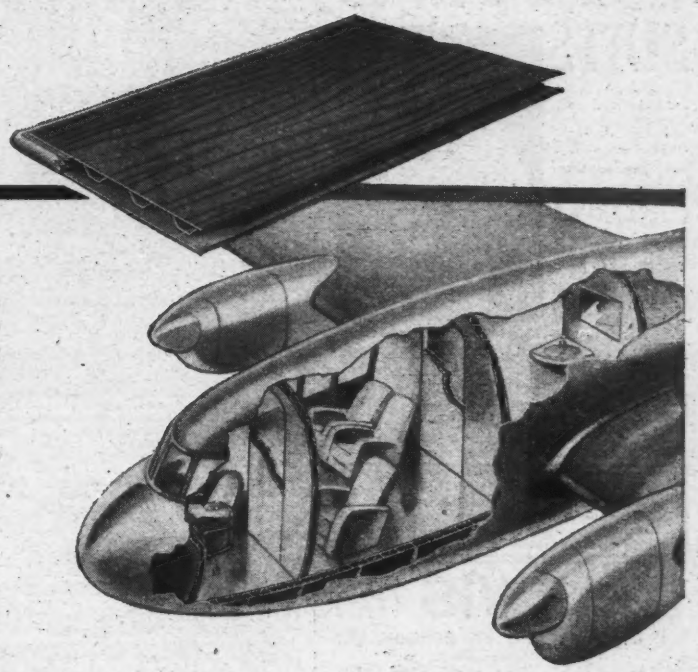
On all the world's air routes, the unequalled underwriting facilities of the British Aviation Insurance Company are at your service.
For 26 years, B. A. I. C. has provided majority protection for the principal British and Foreign aircraft manufacturers, for the world's airline operators, and for passengers, private owners, crews and freight shippers.

THE BRITISH AVIATION INSURANCE COMPANY LTD.,
3-4, LIME STREET, LONDON, E.C.3.
Telephone: Mansion House 0444 (6 Lines). Telegrams: Aviacoy, Lime, London.
Underwriter and Principal Surveyor: Captain A. G. LAMPLUGH, F.R.Ae.S., M.I.Ae.E.

# JABLITE

*Double Skin* PANELS

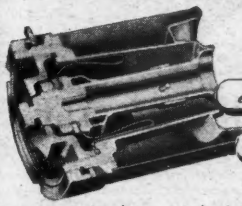
. . . THE MATERIAL OF THE NEW ERA . .



In the construction of aircraft floors, bulkheads, etc., etc., Jablite Double Skin Panels bring revolutionary advantages. First and foremost *no supporting framework is needed.* Imagine the saving this means in money, time and weight! These panels are strong, light, easily handled, easily fitted, and will not warp. Moisture and tropic proof. Quick delivery in standard sizes, with plain birch, decorative or metal face. Also available in curved sections to order. Enquiries are invited together with drawings.

*LIGHT · STRONG · PERMANENT · NO FRAMEWORK NEEDED · EASILY FITTED AND AVAILABLE* ***NOW***

**MOULDED COMPONENTS (JABLO) LTD · MILL LANE · WADDON · CROYDON · SURREY**



*Skilful interpretation*

or more simply . . . the intelligent appreciation of the customer's requirements and–equally important–the production of exactly what is wanted. Such 'skilful interpretation' is an everyday occurrence with us and we are proud to admit it. Remember . . . we are specialists in every type of pressing, stamping, spinning, sheet metal, capstan and automatic work for the LIGHT ENGINEERING INDUSTRIES.

**Hassett & Harper Ltd** REGENT PLACE BIRMINGHAM·1 RP-789D

***LET US SOLVE YOUR PROBLEMS***

*Holdtite*

SURRIDGE'S PATENTS

RUBBER ADHESIVES for all purposes, including Rubber to Metal, Wood, etc. Also Compounds and Dispersions. Technical advice gladly given on problems of adhesion.

**SURRIDGE'S PATENTS LTD.**

"NEW WORKS," CROYDON ROAD,
ELMERS END, BECKENHAM, KENT.

Telephone: BECKENHAM 0168/9. Telegrams: SURRIDGE, BECKENHAM.

HIGH STRENGTH LIGHT ALLOYS

BOOTH

BIRMINGHAM

*Pioneers in Light Alloys in this country*

**"DURALUMIN"**

**"DURAL"**

REGISTERED TRADE MARKS

**JAMES BOOTH & COMPANY, LIMITED,**

ARGYLE STREET WORKS. BIRMINGHAM, 7

Telephone: EAST 1221. Telegrams: BOOTH, BIRMINGHAM 7

# FLYING SUITS

in fine quality serge finished drill. Zip fastening front, legs and cuffs. In khaki, white or navy ...47/6
(4 Coupons required)

COMBINATION FLYING SUIT, in super quality fawn gabardine. Heavy fleece lined, zip front, legs, etc., £7.15.0
(18 Coupons)

LEATHER and GABARDINE JACKETS, ¾ length. Fleece lined, zip front and cuffs.

LUXOR GOGGLES, 50/-. TRIPLEX GOGGLES, from 7/6 and 17/6.

NATURAL SHEEPSKIN GLOVES, lambswool lined, 32/6 per pair. Double tenure SILK UNDERGLOVES, 22/6 per pair. (2 Coupons).

PRICES INCLUDE PURCHASE TAX.
Catalogue on receipt of 1d. stamp.

**TURN UNWANTED KIT INTO CASH.**
We pay TOP PRICES for *worn* Irvine type jackets, sheepskin lined boots and jackets, leather jackets, flying suits, etc. Call or write. If writing, state full particulars.

**D. LEWIS** LTD. (Dept. F.)
**124, GT. PORTLAND ST., LONDON, W.1**
*No other London address.*
*Tel.: Museum 4314. Tele.: Aviakit, Wesdo, London.*

## Good Progress in the AIRCRAFT INDUSTRY

is open to those who avail themselves of the services of the I.C.S., the world's largest and greatest school teaching by post.

Men who are eligible for the **Air Ministry's Examinations in Categories A, B, C and D** will find the I.C.S. Ground Engineer's Course a sound preparation for success.

We also offer fully adequate instruction to those who wish to enter the **Drawing Office** or to specialise in **Aero Fitting and Rigging** or **Aero-Engine Fitting.** And we have special Preparatory Courses for **R.A.F. Entrants.**

**Special terms for members of H.M. Forces**

*Write to the I.C.S. Advisory Department for booklet of particulars of our Courses in Aeronautical Engineering.*

**INTERNATIONAL CORRESPONDENCE SCHOOLS, LTD.** ICS
**Dept. 182, International Buildings, KINGSWAY, LONDON, W.C.2**

**COTTON BAGS**
FOR SPARE PARTS, Etc.
**WALTER H. FELTHAM & SON, LTD.,**
**Imperial Works, Tower Bridge Road,**
Telephone: HOP 1784. **London, S.E.1**


Rate 3/- per line, minimum 6/- per paragraph. Special rates: Auctions, Contracts, Patents, Legal and Official Notices, Public Announcements, Tenders, 4/- per line, minimum 8/- per paragraph. Situations Wanted advts. 3d. per word, minimum 4/-. Box Nos., 4 words, plus 1/-. Press day, 1st post Friday. No responsibility accepted for errors. Remittances payable to :—"Flight" Publishing Co., Ltd., Dorset House, Stamford St., London, S.E.1.

## AIRCRAFT FOR SALE AND WANTED

AUSTER Distributors for Yorkshire.

ARNOLD G. WILSON, Ltd., 232, Harrogate Rd., Leeds, 7. Tel. 41014-5. Demonstrations anywhere, anytime. [0257

AIRWORK, Ltd.

AIRWORK, Ltd., can now deliver the Airspeed "Consul" one month from receipt of order; price £5,500. Airwork offer earliest deliveries of all types of new and reconditioned aeroplanes.

AIRWORK, Ltd., 134, Bath Rd., Hounslow, Middlesex. Hounslow 5451. [0254

W. S. SHACKLETON, Ltd., 175, Piccadilly, offer :—

**£4000**—D.H.86 11-passenger 4-engined Express Air Liner offered at Perth, Western Australia, with 12 months' C. of A. and enormous inventory of airframe spares, also 2 newly overhauled spare engines; this aeroplane is in perfect condition.

**£595**—B.A. Swallow Mark II, Pobjoy Cataract III engine; this is the best Swallow in the country; it has just been completely overhauled at a cost of £250, and is offered with renewed Certificate of Airworthiness; engine also was completely overhauled by the makers in 1939 at a cost exceeding £200; only 10 hours' running since.

**£695**—Miles Sparrowhawk, Gipsy Major engine; a fast, sporting, long-range monoplane, with 12 months' C. of A., property of well-known test pilot.

**£995**—Miles Whitney Straight; starter, generator, navigation lights, Sperrys and 12 months' C. of A.; in beautiful order.

**£595**—Taylorcraft A., American-built, under 30 airframe and engine hours since new; C. of A. until February, 1947; Continental A-40-5 engine; fitted dual controls, brakes, wheel spats, tail wheel; any demonstration.

W. S. SHACKLETON, Ltd., 175, Piccadilly, London, W.1. [0070

R. K. DUNDAS invite your enquiries for all types of aircraft engines, accessories or aerodrome equipment.

R. K. DUNDAS offer a Stinson Voyager 3-seater cabin monoplane 85hp Continental motor, under 100 hours, a lovely little machine for getting about in, beautifully fitted and in brand new condition; £850.

R. K. DUNDAS offer a Miles Sparrowhawk single-seater low-wing monoplane, property of test pilot, a beautifully kept and fast sporting machine, innumerable extras, owner going abroad, must sell; £850.

R. K. DUNDAS arrange hire-purchase, insurance, inspection and overhauls.

R. K. DUNDAS require all types of aircraft provided they are in good condition; C. of A. an advantage.

R. K. DUNDAS, Ltd., 4, St. James's St., S.W.1. Tel. Whi. 2848. [0212

ENGINES for disposal; Gipsy Six Mk. Is and IIs; Lynx; Wright Whirlwind R.760.E1; new and second-hand.—Apply Box 8063, c/o *Flight*. [6980

AIRCO, Ltd., suppliers of aircraft, accessories and equipment. Export inquiries invited.—Eagle House, 109, Jermyn St., London, S.W.1. Tel.: Whitehall 8863. [6949

MARSHALLS' FLYING SCHOOL, Ltd., for new and second-hand aircraft; part exchanges; sales and service repeat service.—The Airport, Cambridge. Tel. 56291. [0245

AIRCRAFT urgently required for training and charter work, with or without C. of A.; highest prices paid.—Brevet Flying Club, Ltd., 11, Chesterfield St., Mayfair, W.1. Gro. 1353 and 1417. [0249

**£445**—Comper Swift single-seater, fast, light craft, 150mph, 75hp Pobjoy engine, range 600 miles, made as new, 12 months Certificate of A.; 1 Pobjoy 75hp, in perfect condition, £45.

A. B. GOLAY, 7, Maychurch Close, Stanmore, Middlesex. [7050

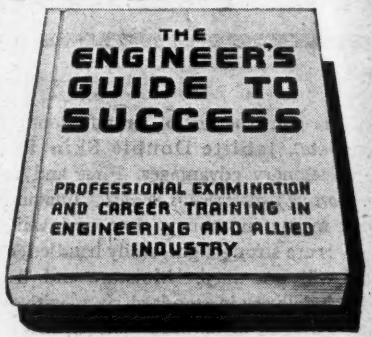
CECIL KAY AIRCRAFT, Ltd., 10-20, Essex St., Birmingham, are Midland distributors for Auster and Percival aircraft; place your order now for early delivery; demonstrations can now be given. [0233

KENNINGS, Ltd., Taylorcraft, Auster and Percival Proctor distributors, are in a position to give demonstrations to prospective purchasers.—Full details obtainable from the distributors, Kennings, Ltd., Queen St., Derby. Tel. 3636. 232, Cheetham Hill Rd., Manchester. Tel. Bla. 9111. [0235

FIELD AIRCRAFT SERVICES, Ltd., Great Woodcote House, Woodcote Drive, Purley, Surrey (Tel. Wallington 7001), offer reconditioned Percival Proctor aircraft for sale, priority given for export; early delivery; price £1,500. Field Aircraft Services are approved agents for spares for Proctors. Our sales and service organisation welcome your enquiries for all types of new and used aircraft, engines, accessories, etc.


# FIRST PLACE COURSES

**THIRTY-SEVEN FIRST PLACES** have been gained by the home-study students of the T.I.G.B. in the A.F.R.Ae.S. Examinations of the Royal Aeronautical Society—a great and unapproached record.




Aeronautical and Engineering Students should particularly note that both Government and Industry have publicly stated that young men with technical knowledge and qualifications are to receive every chance of rising to the highest positions within their capacity in post-war industry. Write to-day for "The Engineer's Guide to Success"—free—and use the FIRST PLACE COURSES of the T.I.G.B. to obtain qualifications and success.

**THE TECHNOLOGICAL INSTITUTE OF GREAT BRITAIN,**
**37, Temple Bar House, London, E.C.4.**

# "ENGINEERING OPPORTUNITIES"

## IMPORTANT GUIDE

This unique handbook, "Engineering Opportunities," outlines over 200 Courses of technical instruction, including **Aeronautical Engineering, Aeronautical Design, Aero Engines, Air Navigation, Ground Engineers' Licences. A.F.R.Ae.S., A.M.I.Mech.E., R.A.F. Maths.,** etc., etc. Our Courses have been approved by the **Royal Aeronautical Society** and

WE GUARANTEE
**"NO PASS—NO FEE"**

A copy of this enlightening guide to well-paid posts will be sent on request—**FREE.**

**BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY**
**308, Shakespeare House, 17-19, Stratford Place, London, W.1.**

## *Quick deliveries*

OF CASTINGS FOR
**AIRCRAFT JIGS**
AND FIXTURES. ALSO ALL TYPES OF MEEHANITE CASTINGS
LET OUR REPRESENTATIVE CALL ON YOU. WRITE TO
**WINGET LTD ROCHESTER KENT**

**TURNBUCKLES • PIPE TO PIPE CONNECTIONS**
to the specific requirements of our customers.

**Bar Repetition Products made specially to Air Ministry Requirements**

**Makers of all types o repetition products from the bar in all metals.**

**M·C·L and REPETITION LTD. Pool Lane, Langley, B'ham.**
*Phones:* **BROADWELL 1115 (4 lines) · 1737** *Grams:* "KARLYTEKO, LANGLEYWORKS."

### SITUATIONS VACANT

GOVERNMENT of India.

APPLICATIONS are invited for the post of Director of Air Routes and Aerodromes in the Civil Aviation Directorate, Government of India.

CANDIDATES must have had a long and varied experience in aviation, with close practical experience of the development and management of aerodromes, air route organisation and air traffic control, with administrative experience and capacity of a high order.

APPOINTMENT on contract for five years; fixed pay throughout up to Rs.2,000 per month (£1,800 p.a.), according to age, qualifications, etc., plus war allowance; free passage to and from India; free medical attention.—Further particulars and forms of application may be obtained by postcard from the Office of the High Commissioner for India, India House, Aldwych, W.C.2. Applications must be submitted to the above address not later than June 8th, 1946. [7026

SENIOR Stressman, having at least 5 years' experience on aircraft structural stressing.—Write Auster Aircraft Ltd., Thurmaston, Leicester. [7015

LICENSED wireless operators required for charter work on Ansons; good pay.—Reply C.L. Air Surveys, Ltd., 140, Cromwell Rd., Kensington, S.W.7.

TECHNICAL illustrators required for illustrating spare parts schedules.—Reply, stating age, experience and salary required, to Chief Draughtsman, de Havilland Aircraft Co., Ltd., Hatfield Aerodrome, Herts. [7040

GOOD rates for fully approved acetylene welders, plus substantial production bonus; unapproved welders trained to approved standard; canteen facilities, 5-day week.—Auster Aircraft Ltd., Thurmaston, Leicester. [7016

SENIOR draughtsman, with sound mechanical and/or aircraft experience required immediately; good salary to efficient key men.—Please reply, stating experience, etc., to Reid & Sigrist, Ltd., Desford Aerodrome, Leicester. [7031

WIRELESS Instructor required; applicants should hold City and Guilds II or other recognised qualifications. Air Operator's Licence or P.M.G. certificate would be an advantage.—Apply Air Service Training, Hamble. [7048

SENIOR technical assistant required, with good experience in stressing of aircraft structures; applicants should give details of qualifications, experience, age, and salary required.—Reid & Sigrist, Ltd., Desford, Nr. Leicester. [7032

CHIEF Inspector of Aircraft required, not under 30, with wide experience of both large and small types of aircraft, water and air-cooled engines, and clearance of aircraft for C. of A. requirements.—Box 8440, c/o *Flight*. [7049

ENGINEERING research assistant for aeronautical development work in Southampton area; University degree and some experience in engineering or aeronautical development or research work essential.—Box 8219, c/o *Flight*. [6998

WANTED, senior draughtsman with aircraft experience, by a well-established firm in Southern England.—Write, giving particulars of experience and salary required, to Box L5077, A.K. Advg., 212A, Shaftesbury Ave., W.C.2. [7011

AIRCRAFT loftsmen, fully qualified men required for work on a new and interesting project.—Reply, stating age, experience, and salary required, to Chief Draughtsman, English Electric Co., Ltd., Aircraft Division, Corporation St., Preston. [6913

AIRCRAFT stressmen, fully qualified men required for work on a new and interesting project.—Reply, stating age, experience and salary required, to Chief Draughtsman, English Electric Co., Ltd., Aircraft Division, Corporation St., Preston. [6912

AIRCRAFT draughtsmen, fully qualified men required for work on a new and interesting project.—Reply, stating age, experience, and salary required, to Chief Draughtsman, English Electric Co., Ltd., Aircraft Division, Corporation St., Preston. [6911

AIRCRAFT repair work.—Ex-R.A.F. (Class A release), fitters, airframe and engine and electricians with experience on Wellington aircraft.—Apply Brooklands Aviation, Ltd., Brooklands Aerodrome, Weybridge, Surrey, or Buttocks Booth, Northampton. [7041

THE De Havilland Aircraft Co., Ltd., Hatfield, have vacancies for draughtsmen experienced in aircraft electrical installations.—Reply, stating age, experience and salary required, to Chief Draughtsman, de Havilland Aircraft Co., Ltd., Hatfield Aerodrome, Herts. [7039

APPLICATIONS are invited for pupil apprenticeships from secondary and public school boys who will be leaving school at the end of the summer term 1946; applicants should be between the ages of 16 and 17½, and should have reached at least school certificate standard. The next entrance tests will be held on Friday, June 14th, 1946, and applications should be addressed to the Apprentice Supervisor, Vickers-Armstrongs, Ltd. (Aircraft Section), Weybridge Works, Surrey, to be received not later than June 5th, 1946. [7038

### SITUATIONS WANTED

AUSTRALIAN (28), ex-Flt. Lt., pilot B licence applied for, 1,150 hours multi, twins and singles, seeks position air lines, taxi or charter.—Box 8396, c/o *Flight*. [7028

DRAUGHTSMAN, 29, wishes to join aircraft company starting new project; 12 years with leading aircraft firms, wood, metal, mechanical experience.—Box 8512, c/o *Flight*. [7054

R.A.F. warrant officer, due for release shortly, 5 years' service, age 25, good education, speaks Spanish, Italian, French, keen to learn and work hard, requires position, flying or ground.—Box 8511,

AT WAR
We are proud to have repaired 2827 Aircraft for the R.A.F. and the Royal Navy
AT PEACE
We offer a complete experienced Aeronautical Service to Charter Operators Flying Clubs & personal plane owners

1 Sales and Part Exchange
2 Conversions of Service Aircraft
3 Modifications and Special Installations
4 Certificates of Airworthiness Overhauls
5 Engine Overhauls
6 Contract Servicing

Repairers Approved by The Royal Aero Club

Prototype Construction | Approved design Organisation

PORTSMOUTH AVIATION LIMITED
THE AIRPORT, PORTSMOUTH Tel Portsmouth 74374

Aero & Jig & Tool Draughtsmen in Great Demand

MEN AND YOUTHS

There is an insatiable demand for Aero, Jig and Tools, etc., Draughtsmen and Inspectors. So acute is the present shortage that employers are only too anxious to engage those with no previous practical experience who are able to prepare neat and accurate drawings.

QUALIFY AT HOME—IN SPARE TIME

After brief, intensely interesting study—undertaken at home in your spare time—**YOU** can secure an attractive and interesting post as **Aero-Draughtsman.** Numerous vacancies are also available in **Electrical, Mechanical, Plastics,** etc., branches of Draughtmanship.

FREE GUIDE

The Free Guide contains 132 pages of information of the greatest importance to those seeking such success compelling qualifications as **A.M.I.Mech.E., A.F.R.Ae.S., A.M.I.P.E., A.M.I.E.E., Matric. and B.Sc.,** etc., also **R.A.F. Entry** (Maths., etc.), together with particulars of our remarkable Guarantee of

*SUCCESS—OR NO FEE*

*Write now for your copy of this remarkable publication. It may well prove to be the turning point in your career.*

NATIONAL INSTITUTE OF ENGINEERING

(Dept. 427), 148-150, HOLBORN, E.C.1
(South Africa Branch E.C.S.A., P.O. Box 8417, Johannesburg.)


### SITUATIONS WANTED

"B" licence pilot, age 25, 1,000 hours flying, free for immediate employment.—Box 8510, [7047

B LICENCE, ex-Squadron Leader, D.F.C., 1,500 hours, 25 types, age 25, go anywhere, do anything, reads P/O. Prune regularly.—Box 8439, c/o *Flight*. [7047

AERO-ENGINE fitter, ex-R.A.F. (Class A), seeks employment in civil aviation, five years' experience in-line and radial, installation, inspection and repair.—Box 8437, c/o *Flight*. [7045

CAPABLE business woman seeks interesting post as personal assistant to executive of small company, first-class experience; 8 years main departments aviation, expert stenographer; aerodrome preferred.—Box 8436, c/o *Flight*. [7044

BUSINESS man, ex-R.A.F. Transport Command pilot proceeding to South Africa, July-August, wishes to offer his services as ferry pilot to deliver an aircraft to purchaser in S.A. in return for expenses only.—Box 8438, c/o *Flight*. [7046

EX-FLT. LT. Pilot, age 30, desires situation, aviation or industry, 1,600 hours' flying, 1,300 hours' captain, 4-engine, including 750 hours' instruction, 5 years fitter aero engine, 3 years' bench and machine shop practice.—Box 8399, c/o *Flight*. [7037

PILOT (S/Ldr.), aged 34, 10½ years' experience flying and administration R.A.F., 2,000 hours, gyroplane, helicopter, single and twins, current A licence, requires situation, not necessarily flying. South or East Africa.—Box 8509, c/o *Flight*. [7051

FLYING Officer, R.A.F. engineering branch, age 25, on release leave, requires employment in aeronautical engineering concern, either in development or production sphere; qualifications, 2nd year engineering diploma L.U., Grad. A.M.I.Mech.E., 2 parts A.R.Ae.S.—Box 8398, c/o *Flight*. [7036

EX-F.A.A. pilot (23), single, seeks position now, 900 hours, chiefly Swordfish, Barracuda Avenger, 6 months' pre-war ferrying and air display in Australia, all naval operational types; senior pilot, School of Naval Airborne Radar since; anything progressive; home or abroad.—Box 8435, c/o *Flight*. [7043

PRODUCTION engineer, A.F.R.Ae.S., A.M.I.P.E., requires executive position as works or production manager; experienced in process planning, jig and tool design, production control, estimating, programme planning, factory layout and administration of factories employing up to 3,000 productive operators; available at one month's notice.—Box 8220.

AIRCRAFT engineer, aged 33, M licence, A.B.C.D.X., A.I.D., approved chief inspector, seeks inspection or engineering executive position where good salary is paid for extensive knowledge, proved organising ability, and wide practical experience; present position terminates shortly with end of Government repair contract.—Box 8397, c/o *Flight*.

### MISCELLANEOUS

35mm developing, 3/6; 4½×3¼, 6d.; p.c., 9d.; cameras bought.—251, Liverpool Rd., N.1.

MONOMARK; permanent London address; letters redirected; 5/- p.a.—Write BM/MONO88, W.C.1.

R.A.F. officers' uniforms purchased; new and reconditioned kit for sale.—Fishers, 88, Wellington St., Woolwich. Tel. Woolwich 1055. [6196

COMPLETE R.A.F. outfits, for newly-commissioned officers, in stock or to measure; write for price list.—Fishers, 88, Wellington St., Woolwich. [6978

R.A.F. surplus.—Astro compass Mk. II, limited quantity only, 37/6 each, post free in carrying case.—Harverson, 88, Charlmont Rd., Tooting, London, S.W.17. [7005

TYRES.—Sound second-hand tyres, 16s, 20s, 30×5, 30×6, 34×7, etc.—Willow Bank Motors, Sipson Corner, Bath Rd., West Drayton, Middx. Tel. West Drayton 2949.

ECCLES Road Nymph, 15ft 6in long, double panelled, lantern roof, one double, two single beds, gas cooking and lighting, sink, wardrobe, two rooms.—F.O.C. Caravan Centre, 206, Cricklewood Broadway, N.W.2. Gladstone 2234. [0207

BEAUTIFULLY made, highly polished aluminium "Hurricane," Battle of Britain replica, mounted on handsome ashtray, limited quantity available; 26/6 each, cash with order to: J. A. Stuart, St. Lawrence, Bardney, Nr. Lincoln. [7014

AIRCRAFT souvenirs, solid brass scale castings, British-U.S.A. types, including Meteor, Vampire, etc., unfinished for filing and polishing, stands, accessories, finished models, chromium plated, mounted on display stands complete for presentations and gifts (export enquiries invited); 2½d. stamp for lists.—Gibb, 153, Oxford St., Glasgow, C.5. [6817

OILSKINS free of coupons.—Surplus from public utility company and reconditioned as new; suit consists of heavy black oilskin ¾ length coat, shoulders interlined, button to neck, with storm collar, also heavy black oilskin trousers, guaranteed absolutely waterproof; price 35/- per suit, postage 1/- extra; sou'wester to match, 3/- extra; all sizes orderable; state chest and waist measurement when ordering, limited supplies; cash back if dissatisfied.—Willson Brothers (Dept. 14), Epsom, Surrey. [0234

A CARAVAN welcome.—Yes, a pleasant (I hope!) kindly attitude, just as warm if you've only come for advice, which I ought to be able to give after 9 years' van living and that caravan paper editorship; lower prices for good stuff, too, and a big selection; easiest terms. Spotlight: As new, end kitchen 1939 Siddall Sunset, £725; 4-berth, dbl. pan. van, coal fire, £225; also the new Eccles. Ensor, Car Trailer.—A. S. Jenkinson, opposite "The Dumb Bell," Bath Rd., Taplow. Tel. Maidenhead 2610. Taplow G.W.R. Station (Paddington), 4 minutes' direct walk. Maidenhead ½ mile. Open always till we die of exhaustion. [7035

### PATENTS

THE proprietor of British Patent No. 552769, entitled "Securing fabric coverings to airfoil and like frames," offers same for licence or otherwise to ensure practical working in Great Britain.—Enquiries to Singer, Ehlert, Stern & Carlberg, Steger Building, Chicago 4, Illinois, U.S.A. [7042

# W.B.Bawn

*Sheet Metal Work • Steel Plate Work • Fabricated Welded Steel Work in any thickness • Profile Gas-Cutting • Hydraulic Press-work • Engine Test Beds • Machine-Shop Work • A.I.D. approved*

**ENGINEERS AND CONTRACTORS**

**Byron Works • Blackhorse Lane • London, E.17**

*Phone: LARkswood 4411-3* *Grams: Bopeep, Walt, London*

**& COMPANY, LIMITED, FOR HEAVY METAL WORK**


### AERONAUTICAL ENGINEERS AND AGENTS

R. K. DUNDAS, Ltd.—Aeroplanes, engines, aeronautical equipment and accessories; agents, at home and abroad, for the Aircraft and Allied Industries; branches and agents throughout the world.—Head Office: 4, St. James's St., S.W.1. Tel. Whi. 2848. [0215

### AIR CHARTER

AIR charter and taxi.

HUNTING AIR TRAVEL for door-to-door service, inland or overseas; basic rates below refer to hire of aircraft, irrespective of numbers of passengers carried: Proctor (3 passengers), 1/6 per mile; Rapide (5 passengers), 2/6 per mile.

HUNTING AIR TRAVEL, Ltd., Head Office, 29, Old Bond St., London, W.1. Tel. Regent 5211. Cables, Aircharta Picoy. [0256

P. BENNETT for air taxi service, 1/- per mile, return trip chargeable.—Southampton Airport. Tel. Eastleigh 87697. [6940

MARSHALLS for charter service, with 2-8-seater aircraft, from 1/- to 2/6 per aircraft mile.—Marshalls' Flying School, Ltd., The Airport, Cambridge. Tel. 56291. [0246

MODERN AIR SERVICES, Ltd., Gatwick Airport, Surrey.—Charter and taxi aircraft, 1/6 per mile; direct rail service to airport from Victoria and London Bridge.—Write for further details or telephone Crawley 568. [7027


## NOW AVAILABLE

Registrations can now be accepted for courses of Postal Tuition in either the whole, or any subsection of the new syllabuses for the

**AIRCRAFT NAVIGATORS' LICENCES**

- International and U.K. Legislation
- Lights and Signals
- Form of the Earth : Aeronautical Charts
- Time and the Solar System
- Meteorological Organisation : General Meteorology
- Climatology : Meteorology of Air Routes
- Flight Navigation
- Radio and Radar Navigation
- Instruments, Magnetism and Compasses
- Tides
- Astronomical Navigation

*Write for descriptive booklet.*

### AIRCRAFT SERVICING

FIELD AIRCRAFT SERVICE,

CROYDON, Hanworth, Luton, Nottingham.

NEW and used aircraft.

C. of A. overhauls, repairs, modifications and conversions, maintenance and service contracts, engine repair and replacement service, tool and component manufacture.

FIELD CONSOLIDATED AIRCRAFT SERVICES, Ltd. (A.R.B. approval No. A1 1074/38). Head office: Great Woodcote House, Woodcote Drive, Purley, Surrey. Tel. Wallington 7001. Telegrams and Cables: Fieldair, Purley. [0252

ROLLASON for repairs, overhauls and servicing (approved by A.R.B.).

ROLLASON for C. of A.s; ex-R.A.F. aircraft a speciality.

ROLLASON for everything aeronautical.

ROLLASON for spares, including Rapide, Moth Minor, Auster, Cirrus engines.

W. A. ROLLASON, Southampton Airport. Tel. Eastleigh 87256-7. [6994

MARSHALLS for servicing, repairs and C. of A. overhauls.—Marshalls' Flying School, Ltd., The Airport, Cambridge. Tel. 56291. [0247

AIRWORK, Ltd., can undertake immediate C. of A. overhaul for all types of aircraft; Airwork, Ltd., have up-to-date branches throughout the United Kingdom available for this work; quotations given.—Airwork, Ltd., Westbrook House, 134, Bath Rd., Hounslow, Middx. [6743

T. McDONALD & Sons, aeronautical engineers, Leven, Fife, can place at your service full facilities for the servicing, repairing and C. of A. overhauls, large or small wood or metal aircraft; engine overhauls a speciality, estimates free.—Sole Scottish agents for Percival Aircraft Tel. Leven 444. [6859

### MACHINERY FOR SALE

TWO Heenan & Froude type D.P.X.5 dynamometers, speed range 1,600 to 3,500 at 700hp, complete and in good order; £250 each.—Mathew Bros., Matbro Works, Sandy Lane North, Wallington. Tel. Wallington 4050. [6866

### PERSONAL

THE smoker's heart is full of song;
He sallies forth to buy Tom Long. [0026

### TIME RECORDERS

TIME recorders.—Service rental, Tel. Vigilant 4731.—Time Recorder Supply and Maintenance Co., 28, Mayfield Rd., Sutton, Surrey. [0196

STAFF time checking and job costing time recorders (all makes) for quick cash sale; exceptional condition.—Box 7020, c/o *Flight*. [0040

### PACKING AND SHIPPING

R. & J. PARK, Ltd., 143-9, Fenchurch St., E.C.2. Tel. Mansion House 3083. Official packers and shippers to the aircraft industry. [0012

### TUITION

WILTSHIRE FLYING CLUB.

INSTRUCTION £3 per hour for A, B, and Instructor's Licences; please write for booklet.—High Post Aerodrome, Salisbury. Tel. Middle Woodford 57.

COLLEGE OF AERONAUTICAL ENGINEERING (of Chelsea), College House, Princes Way, Wimbledon Park, S.W.19 (Put. 4197).—Practical training for civil aviation. Syllabus from Bursar.

WIRELESS telegraphy.—Postal courses of instruction for P.M.G.; certificates for Merchant Navy, and Air Ministry for Civil Aircraft.—Apply British School of Telegraphy, Ltd., 179, Clapham Rd., London, S.W.9. (Brixton 3847.) Estab. 36 years. [0218

FLYING tuition on Tiger Moth and Auster aircraft at £3 per hour day, and £4 per hour night; also tuition on Proctors and Rapides available; aerodrome 2 miles from Cambridge, with first class restaurant; qualify for your Pilot's "A" and "B" and/or Instructor's licences at Marshalls' Flying School, Ltd., The Airport, Cambridge. Tel. 56291. [0244

### HOTELS AND ACCOMMODATION

ROYAL OAK HOTEL, Keswick-on-Derwentwater, heart of English Lake District; offers restful holiday to Air Force personnel; first-class accommodation at reasonable charges. [0814

### AIRCRAFT TRANSPORT

LEP TRANSPORT, Ltd., leading transport packing, shipping and salvage contractors to Air Ministry, M.A.P., and Aircraft Manufacturers and Operators, Air Freight specialists.—Sunlight Wharf, Upper Thames St., E.C.4. Central 5050 (18 lines).

### CAR HIRE SERVICE

FORCES personnel on leave from abroad requiring cars should apply at Wilson's (Brixton), Ltd., Trinity Gardens, London, S.W.9. Brixton 4011. [0228

### CONSULTANTS

CONSULTANT scientist specialises in unusual problems.—Enq. invited, trade or private.—Box 5752.

S. J. NOEL-BROWN & Co., the Industrial Management Consultants, and their Associates, are now in a position to consider forward contracts and assignments, home or overseas, in regard to production and material control and time and motion study; general investigation and contractual services are available at short notice.—Gt. Peter House, 2, Lord North St., Westminster, S.W.1. Tel. Abbey 2126 (5 lines). Grms. Gayfere Sowest, London. [0210

### BOOKS, ETC.

SUBSCRIPTIONS to "Air News with Air Tech.," America's leading aviation monthly, now available, 16/6 yearly (12 issues).—Post free from Phillip Andrews Publishing Co., 143 Fleet St., London, E.C.4. Cen. 3992. [7030

### CARS WANTED

CARS bought for cash, any condition.—Wilson's, Coachworks, 16, Trinity Gdns., S.W.9. Brixton 4011.

This world-famous stripper is guaranteed acid and alkali free, non-inflammable, and non-injurious to eyes, skin or clothing.

It works rapidly and thoroughly, strips down to the bare wood, metal or glass *in one application* and, being non-volatile, does not dry up or leave a sediment. Usable to the last drop.

It has been used for many years, and with entire satisfaction, by the British Aircraft and Automobile Industries.

**Owing to shortage of materials we are still producing and supplying QUICKER-STRYP WAR TIME SUBSTITUTE No. 32, which, like the original it temporarily replaces, is still the best on the market.**

**Due to control, supplies are available only for work of national importance.**

**QUICKSTRYP CHEMICAL CO. LTD.**

**104, Morley Street, Bradford.**

*We deal exclusively in Paint Removers. Ask for descriptive leaflet of our Products.*

*For Economy use* QUICKER-STRYP

# CENTRAL NAVIGATION SCHOOL

# STRAIGHT AVIATION TRAINING LTD.

**BUSH HOUSE, ALDWYCH, LONDON, W.C.2**

**Temple Bar 6828**

# IN THE PICTURE...

**The development of the Gas Turbine Engine for Aircraft has called for a parallel development in specialised electrical equipment. The Rotax range includes starter motors for both Reciprocating and Gas Turbine Aircraft Engines, each designed to meet the particular requirements of a specific type and power of engine.**

IGNITION EQUIPMENT AND HARNESS. STARTERS FOR RECIPROCATING AND GAS TURBINE ENGINES. D.C. AND A.C. MOTORS AND GENERATORS. ELECTRIC ACTUATORS. LIGHTING OF ALL TYPES INCLUDING LANDING LAMPS.

ROTAX

ROTAX LIMITED
LONDON · N.W.10 · ENGLAND

# Supplying remote projects . .

Mining projects, bridge-building, track-laying and exploration work in remote and inaccessible regions provide unlimited opportunities for making use of the advantages exclusive to cargo-carrying aircraft. For rapid delivery of supplies, food, machinery replacements . . . carrying personnel between base and location . . in these, and many other ways, the cargo aeroplane is able to supply a unique service. The " Bristol " Freighter has been specially designed and constructed to operate under these arduous conditions. Robustly-built and with many inherent features cutting maintenance needs to a minimum, the Freighter operates at an economical speed from small or undeveloped landing grounds with a cargo load of 4 to 4½ tons. Unencumbered stowage space of 2,360 cu. ft. renders it unequalled for operation on any project where a constant stream of supplies is a routine essential.

"Bristol"

THE BRISTOL AEROPLANE COMPANY LTD

"BRISTOL" FREIGHTER . .

has capacity for a 4½ tons cargo payload . .

or for differing ratios of passenger/cargo payload . . .

by facilities enabling rapid rearrangement of seating

Printed in England for the Proprietors, FLIGHT PUBLISHING COMPANY LIMITED, Dorset House, Stamford Street, London, S.E.1, by THE CORNWALL PRESS LTD., 1-3, Paris Garden, London, S.E.1. "Flight" can be obtained abroad from the following: AUSTRALIA and NEW ZEALAND: Gordon & Gotch, Ltd. INDIA: A. H. Wheeler & Co. CANADA: Imperial News Co., Gordon & Gotch, Ltd. SOUTH AFRICA: Central News Agency, Ltd., Wm. Dawson & Sons (S.A.), Ltd. UNITED STATES: The International News Co. Entered as Second Class at the New York, U.S.A., Post Office.